Upper Mississippi River

National Wildlife and Fish Refuge

Comprehensive Conservation Plan Approval

Submitted by:

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Don Hultman, Refuge Manager — Date

Concur:

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Nita M. Fuller — Date
Regional Chief, National Wildlife Refuge System

Approve:

10/24/06

Robyn Thorson — Date
Regional Director

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Don Hultman
Refuge Manager
September, 2006

Executive Summary

This Comprehensive Conservation Plan (CCP) will guide the administration and management of the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) for the next 15 years and meets a requirement in the Refuge Improvement Act of 1997.

The Refuge was established by act of Congress in 1924 for the purpose of providing a refuge and breeding ground for migratory birds, fish, other wildlife, and plants. The Refuge encompasses approximately 240,000 acres in four states in a more-or-less continuous stretch of 261 miles of Mississippi River floodplain from near Wabasha, Minnesota to near Rock Island, Illinois.

This CCP is the result of four years of extensive public involvement and planning. A Final Environmental Impact Statement was released July 11, 2006 and a Record of Decision was signed August 24, 2006. That decision selected Alternative E, Modified Wildlife and Integrated Public Use Focus, as the CCP for the Refuge.

This CCP contains 43 measurable objectives and many associated strategies that will be carried out over the next 15 years. The objectives are designed to help the Refuge achieve its purposes and contribute to the mission and policies of the National Wildlife Refuge System, while being sensitive to the needs of partner states and agencies, conservation organizations, communities, and the general public. Below is a summary of the major objectives of the CCP.

Acquire from willing sellers 15,000 acres of land within approved boundary.

Seek protection for 13 bluffland areas within the approved boundary.

Improve water quality and reduce and/or address sedimentation.

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Complete pool-wide drawdowns on as many pools as practicable to enhance habitat.

Inventory and reduce invasive plants 10% by 2010, work with others on invasive animals.

Complete $150 million worth of habitat restoration and enhancement projects or $10 million per year compared to $2.7 million per year on Refuge from the Environmental Management Program.

Increase wildlife monitoring and research efforts to guide management.

Increase emphasis on fishery and mussel management in cooperation with the states and Corps of Engineers.

Complete an inventory of the 51,000 acres of Refuge forest and begin management actions.

Maintain abundant hunting and fishing opportunities, and increase opportunities for wildlife observation, photography, interpretation and environmental education.

Adjust the system of Waterfowl Hunting Closed Areas established in 1958 to meet the food and

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rest needs of migrating waterfowl. This means deleting some closed areas, adding some, and adjusting boundaries on others. Total acres will drop from 44,544 acres to 43,652, although a special hunt area, no open water hunting area, and administrative no hunting zones will increase overall acreage that has some restrictions.

Reduce human disturbance to waterfowl and other wildlife using closed areas with a blend of voluntary measures and targeted regulations.

Help ensure a quality hunting experience for the broadest cross-section of the public by eliminating permanent blinds in Pools 12-14 and addressing crowding/behavior issues on a portion of Pool 7.

Better manage commercial-type activities on the Refuge such as guiding services, fish floats, and fishing tournaments in cooperation with the states and Corps of Engineers.

Fine tune existing beach-related uses such as camping and general recreation to safeguard both wildlife and people.

Establish 5 electric motor only areas totaling 1,852 acres (1 exists now) and 8 seasonal slow, no wake areas totaling 9,720 acres to reduce disturbance to fish and wildlife in backwater areas and provide alternative experiences for Refuge visitors. These areas represent about 8% of the water area of the Refuge, and less than 5% of the entire Refuge.

Establish a new and relaxed dog policy that allows owners to exercise and train their dogs while safeguarding other visitors and wildlife.

Improve Refuge boat, canoe, and walk-in accesses.

Replace or construct 4 new offices and 5 new maintenance facilities to replace rental space or aging facilities.

Increase public information efforts and programs.

Increase staff to minimum levels to increase stewardship capabilities for private lands work, fisheries, forestry, biological monitoring, maintenance, visitor services, and law enforcement.

Estimated cost over 15 years if every objective/strategy funded: $227.8 million, of which $177 million (78%) is habitat restoration, maintenance, and land acquisition.

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Chapter 1: Introduction and Planning Background

Introduction

This Comprehensive Conservation Plan (CCP) will guide the administration and management of the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) for the next 15 years.

Comprehensive conservation plans are required by the National Wildlife Refuge System Improvement Act of 1997 to ensure that refuges are managed in accordance with their purposes and the mission of the National Wildlife Refuge System, which is part of the U.S. Fish and Wildlife Service (Service). The Refuge System is the largest collection of lands and waters in the world set aside for the conservation of wildlife, with over 540 units covering more than 95 million acres in the U.S. and its territories.

The Refuge was established by an Act of Congress on June 7, 1924, as a refuge and breeding place for migratory birds, fish, other wildlife, and plants. The Refuge encompasses approximately 240,000 acres of Mississippi River floodplain in a more-or-less continuous stretch of 261 river-miles from near Wabasha, Minnesota to near Rock Island, Illinois.

The location and surrounding area of the Refuge is shown in Figure 1.

The Refuge is an invaluable natural legacy in a complex geopolitical landscape:

A national scenic treasure – river, backwaters, islands, and forest framed by 500-foot high bluffs;

Interface with four states, 70 communities, and two Corps of Engineers districts;

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A series of 11 navigation locks and dams within overall boundary;

Represented by eight U.S. Senators and six U.S. Representatives;

National Scenic Byways on both sides;

3.7 million annual visits, the most of any national wildlife refuge;

Diverse wildlife: 306 species of birds, 119 species of fish, 51 species of mammals, and 42 species of mussels;

Designated a Globally Important Bird Area;

Up to 40 percent of the continent's waterfowl use the river flyway during migration;

Up to 50 percent of the world's Canvasback ducks stop during fall migration;

Up to 20 percent of the eastern United States population of Tundra Swans stop during fall migration;

Figure 1: Location of Upper Mississippi River NWFR

167 active Bald Eagle nests in recent years;

A peak of 2,700 Bald Eagles during spring migration;

Approximately 5,000 heron and egret nests in up to 15 colonies.

The Refuge is divided into four districts for management, administrative, and public service effectiveness and efficiency. The Refuge is also divided geographically by river pools that correspond with the navigation pools created by the series of locks and dams on the Upper Mississippi River. District offices are located in Winona, Minnesota (Pools 4-6), La Crosse, Wisconsin (Pools 7-8), McGregor, Iowa (Pools 9-11) and Savanna, Illinois (Pools 12-14). The Refuge currently has 37 permanent employees and an annual base operations and maintenance budget of $3.1 million.

The Refuge has an overall Headquarters in Winona, Minnesota which provides administrative, biological, mapping, visitor services, planning, and policy support to the districts. District managers are supervised by the refuge manager located in Winona. Two other national wildlife refuges, Trempealeau and Driftless Area, are also part of the Refuge Complex and are coordinated by the refuge manager in Winona. Separate CCPs are also being prepared, or are completed, for Trempealeau NWR and Driftless NWR, although scoping was done concurrently with scoping for this CCP.

Planning Background

Legal and Policy Framework

The Upper Mississippi River National Wildlife and Fish Refuge is managed and administered as part of the National Wildlife Refuge System within a framework of organizational setting, laws, and policy. Key aspects of this framework are outlined below. A list of other laws and executive orders that have guided preparation of the CCP, and guide future implementation, are provided in Appendix D.

U.S. Fish and Wildlife Service

The Refuge is administered by the U.S. Fish and Wildlife Service, Department of the Interior. The Service is the primary federal agency responsible for conserving and enhancing the nation's fish and wildlife populations and their habitats. Although the Service shares this responsibility with other federal, state, tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, threatened and endangered species, certain interjurisdictional fish and marine mammals, and the National Wildlife Refuge System. The mission of the Service is:

"Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

The National Wildlife Refuge System

The Refuge System had its beginning in 1903 when President Theodore Roosevelt used an Executive Order to set aside tiny Pelican Island in Florida as a refuge and breeding ground for birds. From that small beginning, the Refuge System has become the world's largest collection of lands specifically set aside for wildlife conservation. The administration, management, and growth of the Refuge System are guided by the following goals[1] (Director's Order, January 18, 2001):

To fulfill our statutory duty to achieve Refuge purpose(s) and further the System mission.

To conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.

To perpetuate migratory bird, interjurisdictional fish, and marine mammal populations.

To conserve a diversity of fish, wildlife, and plants.

To conserve and restore where appropriate representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems.

To foster understanding and instill appreciation of native fish, wildlife, and plants, and conservation, by providing the public with safe, high-quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

The National Wildlife Refuge System Improvement Act of 1997 and Related Policy

The Improvement Act of 1997 amended the National Wildlife Refuge System Administrative Act of 1966 and became a true organic act for the System by providing a mission, policy direction, and management standards. Below is a summary of the

1. *These goals were changed late in the planning proceess by a new policy released June 26, 2006. The new goals are similar in scope and intent and are included in Appendix G.*

key provisions of this landmark legislation, and subsequent policies to carry out the Act's mandates.

Established Broad National Policy for the Refuge System:

Each refuge shall be managed to fulfill the mission and its purposes.
Compatible wildlife-dependent recreation is a legitimate and appropriate use.
Compatible wildlife-dependent uses are the priority public uses of the System.
Compatible wildlife-dependent uses should be facilitated, subject to necessary restrictions.

Directed the Secretary of the Interior to:

Provide for the conservation of fish, wildlife, and plants within the System.
Ensure biological integrity, diversity, and environmental health of the System for the benefit of present and future generations.
Plan and direct the continued growth of the System to meet the mission.
Carry out the mission of the System and purposes of each refuge; if conflict between, purposes takes priority.
Ensure coordination with adjacent landowners and the states.
Assist in the maintenance of adequate water quantity and quality for refuges; acquire water rights as needed.
Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the System.
Ensure that opportunities for compatible wildlife-dependent recreation are provided.
Ensure that wildlife-dependent recreation receives enhanced consideration over other uses of the System.
Provide increased opportunities for families to enjoy wildlife-dependent recreation.
Provide cooperation and collaboration of other federal agencies and states, and honor existing authorized or permitted uses by other federal agencies.
Monitor the status and trends of fish, wildlife, and plants in each refuge.

Provide Compatibility of Uses Standards and Procedures:

New or existing uses should not be permitted, renewed, or expanded unless compatible with the mission of the System or the purpose(s) of the refuge, and consistent with public safety.
Wildlife-dependent uses may be authorized when compatible and not inconsistent with public safety.
The Secretary shall issue regulations for compatibility determinations.

Planning:

Each unit of the Refuge System shall have a Comprehensive Conservation Plan completed by 2012.
Planning should involve adjoining landowners, state conservation agencies, and the general public.

Compatibility Policy

No use for which the Service has authority to regulate may be allowed on a unit of Refuge System unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. Managers must complete a written compatibility determination for each use, or collection of like-uses, that is signed by the manager and the Regional Chief of Refuges in the respective Service region.

Biological Integrity, Diversity, and Environmental Health Policy

The Service is directed in the Refuge Improvement Act to "ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans…" The biological integrity policy helps define and clarify this directive by providing guidance on what conditions

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constitute biological integrity, diversity, and environmental health; guidelines for maintaining existing levels; guidelines for determining how and when it is appropriate to restore lost elements; and guidelines in dealing with external threats to biological integrity, diversity and health.

Research Natural Area Policy

The Refuge currently has four Research Natural Areas (Nelson-Trevino, 3,740 acres, Wisconsin, Winona District; Reno Bottoms, 1,980 acres, Minnesota, McGregor District; Twelve Mile Island, 900 acres, Iowa, McGregor District; and Thomson-Fulton Sand Prairie, 321 acres, Illinois, Savanna District). The Service's Refuge Manual, Section 8 RM 10, provides guidance for management, administration, and public use of Research Natural Areas, and lists the following objectives of the designations:

To participate in the national effort to preserve adequate examples of all major ecosystem types or other outstanding physical or biological phenomena;

To provide research and educational opportunities for scientists and others in the observation, study, and monitoring of the environment; and

To contribute to the national effort to preserve a full range of genetic and behavioral diversity for native plants and animals, including endangered and threatened species.

Brief Refuge History and Purposes

The creation of the Refuge was largely the result of the Izaak Walton League, and in particular, the efforts of its founder and leader, Will Dilg. Dilg, an advertising executive in Chicago and an avid angler and lover of the outdoors, formed the Izaak Walton League in 1922. For nearly two decades, Dilg had spent much of the summer fishing and enjoying the Upper Mississippi River. In the summer of 1923, he learned of a plan to drain a large portion of the river backwaters and came up with an ambitious solution to the drainage scheme: turn the entire stretch of river into a federal refuge. Remarkably, one year later, due to Dilg's determination, Congress passed the Upper Mississippi River Wild Life and Fish Refuge Act on June 7, 1924. The act authorized the acquisition of land for a refuge between Rock Island, Illinois and Wabasha, Minnesota.

The Refuge name was changed administratively to the Upper Mississippi River National Wildlife and Fish Refuge in 1983 by adding the word

U.S. Fish & Wildlife Service

"National" and changing the two-word Wild Life to the accepted and widely-used single-word "Wildlife" (Regional Director Bulletin, February 28, 1983). The new name was affirmed legislatively by Congress in 1998 through amendment to the original act (Public Law 105-312, October 30, 1998).

The 1924 act set forth the purposes of the Refuge as follows:

"...as a refuge and breeding place for migratory birds included in the terms of the convention between the United States and Great Britain for the protection of migratory birds, concluded August 16, 1916, and

to such extent as the Secretary of Agriculture[2] may by regulations prescribe, as a refuge and breeding place for other wild birds, game animals, fur-bearing animals, and for the conservation of wild flowers and aquatic plants, and

to such extent as the Secretary of Commerce[2] may by regulations prescribe as a refuge and breeding place for fish and other aquatic animal life."

The 1924 Act also had stipulations that would prove to have management implications to this day. First, the states of Minnesota, Wisconsin, Iowa, and Illinois had to give their consent before land acquisition could occur. This consent was granted, with varying conditions, by all the states in 1925. Second, the act specifically prohibited any interference with the operations of the War Department in carrying out any project now or in the future for the improve-

2. Changed to Secretary of the Interior pursuant to reorganization and transfer of functions in 1939 (16 USC 721-731).

ment of the river for navigation. Both of these stipulations are discussed more fully below.

Land acquisition proceeded rapidly beginning in 1925 using funds appropriated by Congress, and from the withdrawal of public domain or federally-owned islands and other lands in the floodplain. Approximately 90,000 acres were acquired. In 1930, Congress authorized the 9-foot navigation project on the Upper Mississippi River, and the Bureau of Biological Survey (precursor to the Fish and Wildlife Service) soon suspended most acquisition. The Corps of Engineers acquired approximately 106,000 acres within the generally accepted boundary of the Refuge that was needed for the construction of a series of locks and dams and subsequent raising of water levels. Management jurisdiction over much of the Corps of Engineers-acquired land was transferred to the Service, with reservations, through a series of cooperative agreements in 1945, 1954, and 1963. The agreement was simplified and language updated in a 2001 amendment. The agreement is discussed more fully below.

Spanning 80 years, the history of the Refuge is varied, storied, and complex, and shaped by organizational, political, and social influences. Surprisingly, there is no consolidated history of the Refuge and historic information remains a mostly disjointed collection of notes, memos, files, and reports. The most complete legal history is contained in a report done by law intern Michael Fairchild in 1982 titled "The Legal and Administrative History of the Upper Mississippi River Wild Life and Fish Refuge." This report is available at Refuge headquarters in Winona.

Today, the Refuge encompasses more than 240,000 acres of land and water as determined by Geographic Information System, or GIS, analysis. The Refuge remains perhaps the most important corridor of fish and wildlife habitat in the central United States, an importance which has increased over time as habitat losses or degradation have occurred elsewhere.

Relationship to Corps of Engineers and the States, and Other Conservation Initiatives

Corps of Engineers

The Corps of Engineers, Department of the Army, has played an active role in the physical and environmental changes on the Mississippi River, and thus the Refuge, for more than 100 years. In 1871, Congress approved funding for the Corps of Engineers to improve the river for navigation, mainly through the removal of snags and occasional dredging. By 1878, the Corps of Engineers was maintaining a 4-foot deep navigation channel on the river and in 1910, Congress authorized a 6-foot navigation channel. The channel was maintained mainly by directing more river current to the main channel of the river through wing dams and backwater closing structures. Demand for greater river shipping capacity and reliability led to Congress in 1930 authorizing and funding a 9-foot navigation channel, and eventually, a series of 29 locks and dams between St. Louis, Missouri and Minneapolis, Minnesota (11 are within the generally accepted boundary of the Refuge). With the Refuge already established, the 9-foot channel would forever link the fate of the Refuge with the Corps of Engineers.

First, acquisition of land for the Refuge by the Bureau of Biological Survey (now the Service) was suspended since the Corps of Engineers had more funding and needed to move quickly to keep the 9-foot project on track. The planned locks and dams would flood thousands of acres of floodplain that needed to be acquired. It also made sense to not have two federal agencies competing for the same land. The Corps of Engineers thus acquired approximately 106,000 acres within the generally accepted boundary of the Refuge. Some of the Corps of Engineers-acquired land was transferred to the Service via Executive Orders in 1935 and 1936. Locks and dams were completed on the stretch of the river designated for the Refuge between 1935 (Lock and Dam 4 and 5) and 1939 (Lock and Dam 13).

However, it did not take long for conflicts to emerge since the Service and the Corps of Engineers acquired land under different authorities for markedly different purposes: fish and wildlife conservation versus commercial navigation. To help clarify agency roles and responsibilities, cooperative agreements were negotiated and signed in 1945, 1954, 1963, and 2001 (amended the 1963 agreement), each time bringing more clarity to who managed what within the Refuge. An excellent and thorough history of the cooperative agreements is found in the CCP for Mark Twain National Wildlife Refuge Complex, Chapter 3, available on-line at http://midwest.fws.gov/planning/marktwain/index.html.

In summary, the cooperative agreement, with some reservations, grants to the Service the rights to manage fish and wildlife and its habitat on those lands acquired by the Corps of Engineers. These

lands are managed by the Service as a part of the Refuge and the National Wildlife Refuge System. The Corps of Engineers retained the rights to manage as needed for the navigation project, forestry, and Corps of Engineers-managed recreation areas, and all other rights not specifically granted to the Service. A copy of the cooperative agreement can be found online (http://www.fws.gov/midwest/planning/uppermiss) and in Appendix F of the Final EIS/CCP. As part of the planning process, the Refuge initiated efforts with the Corps of Engineers to amend the current agreement to clarify language on the responsibility and authority of each agency, especially in regard to recreational uses. These discussions will continue.

Other conflicts over the years between navigation, fish and wildlife conservation, and recreation influenced Refuge and Corps of Engineers cooperative working arrangements. In the 1950s and 1960s, there was growing concern over the common practice of placing dredged material from navigation channel maintenance in the marshes and backwaters of the river. These concerns were heightened with talk of a 12-foot navigation channel in the mid-1960s; new studies on dredging impacts; and new national environmental laws such as the Water Resources Planning Act of 1962, National Environmental Policy Act of 1969, and the Federal Water Pollution Control Act of 1972. In 1973, the State of Wisconsin sought a preliminary injunction against the Corps of Engineers to prevent the disposal of dredged material on Crosby Island and vicinity (Pool 8), and in 1974 filed another injunction for disposal at several other sites in Pools 4-8 and one further down-river. The State of Minnesota joined Wisconsin in the 1974 injunction. These legal actions were the impetus for more structured cooperation.

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In 1974, the Corps of Engineers and the Service began work on a long-range management strategy for the Upper Mississippi River. A broad-based task force representing five states and several federal agencies was formed under the auspices of the Upper Mississippi River Basin Commission, and became the Great River Environmental Action Teams (GREAT). The Great River Study was authorized by Congress in 1976 and called upon the Corps of Engineers, in concert with other agencies and the states, to develop a management plan that looked at the needs of navigation, barge traffic, fish and wildlife, recreation, watershed management, and water quality. The resulting GREAT studies not only provided a comprehensive look at all aspects of the Upper Mississippi River, but provided the institutional framework for the Service, Corps of Engineers, states and other agencies to work together to meet often divergent needs and mandates.

In 1978, Congress mandated that the Upper Mississippi River Basin Commission complete a comprehensive master plan for the Upper Mississippi River, which includes the Refuge. The plan was completed in 1982 and encompassed many of the recommendations developed in the GREAT studies for dredge material disposal, fish and wildlife conservation, and recreation management.

In 1983, the Service and the Corps of Engineers (St. Paul District), in cooperation with Minnesota, Wisconsin, and Iowa, completed a Land Use Allocation Plan for Refuge- and Corps of Engineers-acquired lands in Pools 1-10 (Pools 4-10 affect the Refuge). The plan, through policy statements and detailed maps, provided a clear, practical, and balanced plan to guide future federal land use actions. In effect, the plan was a zoning plan for federal lands, allocating lands in the floodplain for wildlife management, navigation project operations, low-density recreation, intensive recreation, and natural areas. A similar plan for Pools 11-14 was completed with the Corps of Engineers (Rock Island District), in cooperation with Wisconsin, Iowa, and Illinois in 1986 as part of the Refuge Master Plan process completed in 1987. Both Land Use Allocation Plans remain important references for day-to-day operations and project planning for the Refuge and the Corps of Engineers, although updates are needed to reflect new acquisitions and changing resource needs.

In 1986, Congress authorized the Corps of Engineers to carry out an Environmental Management Program (EMP) as part of the Water Resource

Development Act of the same year. The EMP is composed of two elements: 1) planning, construction and evaluation of fish and wildlife habitat rehabilitation and enhancement projects, or HREPs, and 2) long-term resource monitoring including analysis and applied research, known as LTRMP. To date, the EMP has completed 40 habitat projects with many under construction or in various stages of design with a total affected area of 140,000 acres. Many of these projects are on the Refuge as well as the other Upper Mississippi River refuges of Trempealeau, Mark Twain Complex, and Illinois River Complex. The LTRMP element has provided critical information on the status and trends of fish, wildlife, and aquatic plants; GIS habitat analysis; and other useful scientific information used in refuge management and planning.

In 2005, the Corps of Engineers released a Final Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study after nearly 10 years of effort. The Service and the Refuge have been involved in review and comment of the study at virtually every stage. The study recommends a dual-purpose approach of improving both navigation efficiency and river ecosystem restoration, the latter at a scale that would be many times larger than the current EMP, and more comprehensive in terms of the floodplain affected and the scope of projects that could be undertaken. Although action by Congress is uncertain, the study may hold great promise in reversing decades of habitat decline on the Upper Mississippi River and the Refuge.

Ongoing Refuge coordination with the Corps of Engineers and the states is accomplished at several levels. One of the long-standing coordination frameworks is the interagency teams organized by each of the three Corps of Engineers Districts on the Upper Mississippi River. These teams provide field-level coordination for dredging and other navigation operations, habitat project planning, pool habitat plans, monitoring efforts, recreation planning, water level management (pool drawdowns), forestry, and education and outreach programs. Teams include the River Resources Forum (St. Paul District, Pools 1-10), River Resources Coordination Team (Rock Island District, Pools 11-22), and the River Action Team (St. Louis District, Pools 24 to open river). The Refuge is active on the St. Paul and Rock Island district teams, and their various subteams and workgroups.

The States

The Refuge has always enjoyed a unique relationship with the four states of Minnesota, Wisconsin, Iowa, and Illinois. As noted earlier, the Act which created the Refuge in 1924 had a specific stipulation which said:

> "No such area shall be acquired … until the legislature of each State in which is situated any part of the areas to be acquired under this Act has consented to the acquisition of such part by the United States for the purposes of this Act …"

Consent from the state legislatures was granted in 1925, and each state had varying conditions for their consent. In Minnesota, the legislature granted consent March 19 without condition and ceded all state-owned overflow lands to the United States. The ceded lands provision was later rescinded in 1943.

Iowa gave their consent March 31 provided that acquisitions were first approved by various state conservation boards and officials. An additional condition by Iowa granted the United States exclusive jurisdiction over the lands acquired, a condition that would later be reduced in scope to just "jurisdiction" in 1943.

Wisconsin granted consent on May 19 with several conditions. First, their consent was conditioned on the other three states granting consent and that acquisition of tracts be approved by the Governor on the advice of the Conservation Commission. Secondly, the state and its agents reserved the rights of access for fish-related conservation work such as fish rescue in backwaters and operation of hatcheries. Third, Wisconsin retained title to, and custody and protection of, the fishery in the river and adjacent waters. And lastly, their approval was on the condition that:

> "the navigable waters leading into the Mississippi and the carrying places between the same, and the navigable lakes, sloughs and ponds within or adjoining such areas, shall remain common highways for navigation and portaging, and the use thereof, as well to the inhabitants of this state as to the citizens of the United States, shall not be denied."

See Chapter 7, "Public Comment on Draft EIS and Response," in the Final EIS/CCP for a more detailed discussion of this condition.

Illinois granted consent June 30 with the condition that the state retained concurrent jurisdiction over the areas acquired.

Due to often overlapping and shared responsibilities and authorities for fish and wildlife resources between the states and the Refuge, cooperation and coordination have been standard practice since the Refuge was established. The Refuge generally adopts or defers to state regulations and license requirements for the use and enjoyment of fish and wildlife resources. Refuge law enforcement efforts are coordinated with respective state conservation officers. The states are also closely involved in the efforts outlined in the preceding Corps of Engineers section, and often provide the lead for interjurisdictional issues such as pool drawdowns. The Refuge Improvement Act of 1997 also solidified the role of the states in coordinating Refuge management plans and activities.

The states also manage some important and often magnificent wildlife management areas, parks, and forests adjacent to the Refuge, both in and outside the floodplain. Coordination of similar land management needs and programs is regular and ongoing since fish and wildlife, and at times the public, do not distinguish between administrative boundaries. Notable state resource lands are summarized in Chapter 3.

Structured coordination with the states is provided through the Upper Mississippi River Basin Association and the Upper Mississippi River Conservation Committee. Both are key coordination and communication links with the states for conservation efforts on the Mississippi and the Refuge.

The Basin Association was formed by a joint resolution of the Governors of Missouri, Minnesota, Wisconsin, Iowa, and Illinois in 1981 to replace the former federally-authorized Upper Mississippi River Basin Commission. Several federal agencies, including the Service, are non-voting advisory members, but never-the-less, the Basin Association provides an important regional forum to discuss major policy and management issues that affect the Mississippi River and the Refuge.

The Conservation Committee is also a state-sponsored organization with executive board delegates from Minnesota, Wisconsin, Iowa, Illinois, and Missouri. However, its membership since establishment in 1943 has grown to more than 200 resource managers from both state and federal agencies. The manager of the Refuge is a recognized, but non-voting, participant at board meetings, and the Service's LaCrosse Fishery Resources Office provides a coordinator.

Other Conservation Initiatives

The Refuge's location in the floodplain of the Mississippi River makes it an important component of a host of conservation initiatives, plans, and reports. Several of these efforts are outlined below and contain important guidance and direction for preparation of this CCP.

Ecosystem Approach

The Service has adopted an ecosystem approach to conservation which stresses a landscape perspective and cooperation across Service programs and with the wide variety of partners and stakeholders. The Refuge is part of the Service's Upper Mississippi River and Tallgrass Prairie Ecosystem and strives to contribute to these five team goals:

Protect, restore, and enhance populations of native and trust species and their habitats.
Restore natural ecosystem processes, including hydrology and sediment transport to maintain species and habitat diversity.
Promote environmental awareness of the ecosystem and its needs with emphasis on sustainable land use management.
Identify water quality problems affecting native biodiversity and habitat of trust species.
Reduce conflicts between fish and wildlife needs and other uses.

Migratory Bird Conservation Initiatives

Blueprint for Migratory Birds (USFWS, 2004)*:* The U.S. Fish and Wildlife Service is responsible for the conservation and management of more than 800 species of migratory birds that occur in the country. In 2004, the Service released the Migratory Bird Program's ten-year strategic plan entitled: "A Blueprint for the Future of Migratory Birds." It calls for cooperation from all governments and partners to ensure the continued survival of migratory birds. The Blueprint identifies three priorities for the Migratory Bird Program: 1) address the loss and degradation of migratory bird habitat; 2) improve scientific information on bird populations; and 3) increase partnerships to achieve bird conservation. Refuge management activities stemming from the CCP will complement these priorities by addressing needs of some Birds of Management Concern listed in the Blueprint.

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North American Waterfowl Management Plan (USDOI and EC, 1986): This plan is a partnership effort to restore waterfowl populations to historic levels through habitat conservation. The plan outlines several geographic areas, called joint venture areas. The Refuge is a part of the Upper Mississippi River and Great Lakes Region Joint Venture. The goal of the joint venture is to increase populations of waterfowl and other wetland wildlife by protecting, restoring, and enhancing wetland and associated upland habitat. Objectives for the joint venture are 1.54 million breeding ducks and 773 million use-days during migration.

Partners in Flight (Pashley et al. 2000): This initiative seeks to conserve songbirds by identifying priority species, important habitats, and management strategies. Conservation plans have been developed for different regions across the continent and the Refuge lies within the Upper Great Lakes Plain, also known as Physiographic Area 16.

U.S. Shorebird Conservation Plan. (Manomet, 2001)*:* This plan seeks to conserve shorebirds by identifying priority species and important breeding and migration areas, and outlining strategies. The Refuge is included in the Upper Mississippi Valley/ Great Lakes Regional Shorebird Conservation Plan.

North American Waterbird Conservation Plan: Volume One of this plan focuses on 165 species of seabirds and colonial nesting birds such as herons, egrets, and terns. Volume Two focuses on 44 species of non-colonial marsh birds. The plan outlines species' population status, habitat needs, and strategies for conservation.

North American Bird Conservation Initiative (http://www.bsc-eoc.org/nabci.html): This initiative is a continental effort to bring all migratory bird conservation programs together to optimize conservation objectives and strategies. The goal is to facilitate the full spectrum of bird conservation through regionally-based, biologically-driven, landscape-oriented partnerships.

Globally Important Bird Area (American Bird Conservancy, 2004): The Refuge was designated a "Globally Important Bird Area" by the American Bird Conservancy in 1997 due to its national and international importance for migratory birds. The designation helps protect the Refuge through recognition and awareness.

State Comprehensive Wildlife Conservation Plans

All states are responsible for developing and implementing a comprehensive wildlife conservation plan/strategy as a condition of receiving federal funding through the Service-administered Wildlife Conservation and Restoration Program and State Wildlife Grant Program. To date, Illinois, Minnesota, and Wisconsin have completed such plans and Iowa is near completion. States developed these plans in cooperation with many agencies, organizations, and individuals. These plans address a full array of wildlife (including fish and many invertebrates) but must focus on wildlife "Species of Greatest Conservation Need." The Refuge can play a role, through cooperative implementation of conservation actions and resource monitoring efforts, in fulfilling state goals to enhance key habitats (especially floodplain and grasslands) essential to conservation of target species.

Regional Resource Priorities

In 2002, Region 3 of the Service assembled a list of 243 species in the greatest need of attention under the Service's full span of authorities. The priorities are linked to key habitats, concerns, desired outcomes, obstacles, and broad strategies. The priorities help direct human and fiscal resources and are a useful reference and guide when preparing CCPs.

Partners for Fish and Wildlife Program

Since 1987, the Service has worked beyond the boundaries of refuges with landowners and other partners to improve habitat on private land for fish and wildlife. The program is voluntary, relies heavily on a partnership approach, and leverages both ideas and funding from a variety of sources. Through the Partners program, the Service in Region 3 has restored or enhanced 24,780 wetland basins, nearly 189,000 acres of uplands, and nearly 200 miles of streams and riparian areas. Cost sharing agreements and technical assistance are an important

part of the program. The Partners program remains an effective tool in influencing land use off-refuge to improve water quality and quantity on-refuge, as well as meeting the landscape needs of fish and wildlife.

Interagency Reports and Assessments

Over the years, there have been scores of reports, studies, assessments, and action plans done by federal and state agencies, commissions, and workgroups, either singly or as cooperative efforts. Below is a summary of recent works which have been important guides for the preparation of this CCP.

FINAL Integrated Feasibility Report and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study (USACE, 2004): This report and study provides a long-term plan for ensuring navigation efficiency and environmental sustainability on the Upper Mississippi and Illinois Rivers. Of particular interest to the Refuge is the $5.3 billion long-term ecosystem restoration plan to be accomplished by the Corps of Engineers in cooperation with the Service, the five states, and private non-profit groups to improve the natural resources of the river through projects for habitat creation, water level management, fish passage, and floodplain restoration.

Ecological Status and Trends of the Upper Mississippi River System 1998(USGS, 1999): This report of the Long Term Resource Monitoring Program examines and summarizes data collected in the monitoring program since the late-1980s, provides historical observations, and other scientific findings. The report, along with unpublished updates since 1998, provides invaluable science in the areas of river geomorphology and floodplain habitats, watershed relations and changes, hydrology, water and sediment quality, submersed aquatic vegetation, floodplain forest, macroinvertebrates, freshwater mussels, fishes, and birds.

A River That Works and a Working River (UMRCC, 2000): Completed by the Upper Mississippi River Conservation Committee in 2000, the report presents a strategy for the natural resources of the Upper Mississippi River System. The report lists 9 objective areas and discusses tools and measures, or strategies, for achieving. The 9 objective areas are:

Improve water quality
Reduction in erosion, sediment and nutrient impacts
Return of natural floodplain to enable more habitat diversity
Seasonal flood pulse and periodic low flow conditions
Restore backwater/main channel connectivity
Management of sediment transport, deposition and side channels
Manage dredging and channel maintenance
Sever pathways for exotic species
Provide opportunities for native fish passage at the dams

Habitat Needs Assessment (USACE, 2000): This assessment was prepared by the Corps of Engineers in 2000 under the Environmental Management Program in cooperation with the states and federal agencies involved in Upper Mississippi River management. The assessment provides a system-wide analysis of historical and existing habitat conditions, and desired future habitat conditions. It is an important guide to ongoing and future habitat restoration projects.

Environmental Pool Plans (River Resources Forum, 2004)*:* Completed by the interagency Fish and Wildlife Workgroup for Pools 1-10 in 2004, and underway by the River Resources Coordinating Team for Pools 11-22, the Environmental Pool Plans provide a detailed desired future condition of each pool in a 50-year planning framework. These plans have been adopted as the desired future habitat conditions for the Refuge in the Final EIS/CCP (see Appendix O of the Final EIS/CCP for an example of Environmental Pool Plans) .

Upper Mississippi and Illinois River Floodplain Forests (UMRCC 2002)*:* This report was issued in 2002 by the Upper Mississippi River Conservation Committee, Wildlife Technical Section. It provides a historic context, current status and future outlook for the expansive floodplain forest of the Upper Mississippi River System, and recommended actions to sustain and improve the forest habitat on the river and the Refuge.

Conservation Plan for Freshwater Mussels of the Upper Mississippi River System (UMRCC, 2004b)*:* This report was released in 2004 by the Upper Mississippi River Conservation Committee, Mussel Ad Hoc Subcommittee. The plan outlines the history of harvest, biology, status, concerns, and numerous strategies for the conservation, including restoration, of the freshwater mussels in the Mississippi and other rivers.

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Refuge Vision and Goals

The vision for the Refuge provides a simple statement of the desired, overall future condition of the Refuge. From the vision flow more specific goals which in turn provide the framework to craft more detailed and measurable objectives which are the heart of the CCP. The vision and goals were also important in developing alternatives, and are important reference points for keeping objectives and strategies meaningful, focused, and attainable.

Refuge Vision

> The Upper Mississippi River National Wildlife and Fish Refuge is beautiful, healthy, and supports abundant and diverse native fish, wildlife, and plants for the enjoyment and thoughtful use of current and future generations.

Refuge Goals

Landscape: We will strive to maintain and improve the scenic qualities and wild character of the Upper Mississippi River Refuge.

Environmental Health: We will strive to improve the environmental health of the Refuge by working with others.

Wildlife and Habitat: Our habitat management will support diverse and abundant native fish, wildlife, and plants.

Wildlife-Dependent Public Use: We will manage public use programs and facilities to ensure abundant and sustainable hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education opportunities for a broad cross-section of the public.

Other Recreational Use: We will provide opportunities for the public to use and enjoy the Refuge for traditional and appropriate non-wildlife-dependent recreation that is compatible with the purpose for which the Refuge was established and the mission of the Refuge System.

Administration and Operations: We will seek adequate funding, staffing, and facilities, and improve public awareness and support, to carry out the purposes, vision, goals, and objectives of the Refuge.

Planning Issues, Concerns and Opportunities

Issues, which are often synonymous with concerns and opportunities, were identified through the scoping and public involvement process described in Chapter 2. The issues represent input from the public, other agencies and organizations, and Refuge managers and staff, as well as the mandates and guidance reflected in earlier sections of this chapter. This CCP is issue-driven, and as such, each issue is defined and discussed below. More details pertaining to each issue can be gleaned from Chapter 3, Affected Environment.

The issues were critical in framing the objectives and strategies for the various alternatives considered, and formed the basis for evaluating environmental consequences.

Also, these issues do not represent every issue which faces the Refuge and the Upper Mississippi River as a whole, as issues had to be pared to a reasonable level in terms of planning horizon, implementation practicalities, and jurisdictional realities. However, they do represent a reasonable and comprehensive set of issues, which, when converted to measurable objectives in Chapter 4, create a meaningful plan of action to help meet the mission of the Refuge System and the purposes and goals of the Refuge.

Landscape Issues

Refuge Boundary: In many areas of the Refuge, a visitor can locate the Refuge boundary by recognizing where the natural vegetation of the floodplain stops and human development begins. This presence of the Refuge in the floodplain has played a

crucial role in protecting the natural and wild character of the river for 80 years. However, there is constant pressure to the integrity of the Refuge from development that encroaches upon Refuge land via tree cutting, dumping, construction, and mowing along the Refuge boundary. Maintaining an accurate and clearly marked Refuge boundary is a critical basic need of resource protection.

Land Acquisition: Acquisition of land remains a key conservation tool for the well being of fish and wildlife resources, for providing public use opportunities, and for maintaining the wild and scenic character of the Refuge and the Upper Mississippi River as a whole. It is also cost effective to acquire key lands before they are developed, both from a land-cost perspective and from the cost of dealing with negative impacts associated with development adjacent to a national wildlife refuge.

The 1987 Refuge Master Plan identified approximately 36,000 acres of additional lands to be acquired to meet various resource needs. Goal acres by state were: Minnesota – 6,770 acres; Wisconsin – 9,130 acres; Iowa – 7,000 acres; and Illinois – 13,100 acres. Many of these areas are gaps in floodplain habitat between what the Service originally acquired through 1934, and what the Corps of Engineers acquired for the navigation project. Approximately 6,800 acres have been acquired since 1987, or 19 percent of the Refuge Master Plan objective. In addition to Master Plan goals, the Service has previously approved acquisition of approximately 900 acres in the Halfway Creek area of the La Crosse District as part of a water quality and sediment control partnership. To date, about 146 acres have been acquired in this area. A previous proposal to acquire approximately 5,800 acres in the lower Root River floodplain, La Crosse District, is not being carried forward at this time, mainly because the Minnesota Department of Natural Resources has been actively pursuing acquisition in this area. Collectively, there are approximately 25,000 acres remaining to be acquired within the approved boundary of the Refuge (see maps, Appendix G of the Final EIS/CCP).

In September 2003, the Service and the Department of the Army signed an agreement to add 9,404 acres of the former Savanna Army Depot to the Refuge. An amendment to the agreement in August 2004 added another 311 acres, for a total of 9,715 acres. Approximately 3,000 acres of this total was transferred outright with the September 2003 agreement, with the remaining 6,715 acres to be managed as part of the Refuge and transferred as clean-up is completed. This sizeable addition is known as the Lost Mound Unit of the Refuge. In October 2004 another 143 acres (Apple River Island) was added to the Lost Mound Unit by including it in the Cooperative Agreement between the Corps of Engineers and the Service, for a total of 9,858 acres.

There are also a few Refuge tracts intermingled with state wildlife management areas. It would benefit both the Refuge and the states to consolidate ownerships through land exchanges. Examples include tracts within the Whitman Dam Wildlife Management Area (Pool 5) and Van Loon Wildlife Management Area (Pool 7), Wisconsin. Consolidation would provide consistent management and regulations and reduce confusion by visitors to these areas.

Bluffland Protection: The stunning bluffs which frame the 261-mile long Refuge are a key component of its scenic and wild character, and critical to the entire viewshed of the river valley. Most of the bluffs are in private ownership, while some are protected by state and local parks, forests, and wildlife management areas. The 1987 Master Plan identified 13 bluff land areas for acquisition, primarily to protect potential nesting sites for the peregrine falcon, an endangered species at that time. These areas contain bluffs, rock outcrops, dry "goat" prairies, and other relatively inaccessible features that contribute to the wild and scenic qualities of the river corridor, and harbor a stunning plant and wildlife diversity. However, bluff areas are increasingly being developed for private residences or other uses which threaten these values.

Natural Areas and Special Designations: The Refuge currently contains four federally-designated Research Natural Areas totaling 6,946 acres. Some of the biological values which led to the designation of these areas are threatened by habitat changes. Management plans are needed to ensure the future integrity of these areas and to increase public awareness and appreciation.

There is also an opportunity to add the Refuge to the list of Internationally Important Wetlands under provisions of the Ramsar Convention. The treaty resulting from the convention, ratified by the U.S., maintains a global registry in Switzerland of wetlands designated as internationally significant for migratory birds and other natural and cultural values. An attempt to get the Refuge designated fell short in the 1990s.

Environmental Health Issues

Water Quality: The Refuge Improvement Act of 1997 called upon the Secretary of the Interior to administer the Refuge System in a way that will "ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations" and "assist in the maintenance of adequate water quantity and quality to fulfill the mission of the System and the purposes of each Refuge." Water quality is a key to the overall health of the food chain which drives and sustains the multitude of fish, wildlife, and plant species which rely on the Refuge for critical parts, or all, of their life cycle requirements. Although pollution from urban centers has been drastically reduced, and certain toxic chemicals such as DDT have been banned, several water quality concerns remain. These include sediment which is filling main pools, channels and backwaters; toxic substances in both the water and sediment which pose direct and indirect threats to animals and humans; and nutrient loads from land use practices or inadequate waste treatment.

Water Level Management: Completion of the current 9-foot navigation project with its series of low head dams had a tremendous ecological impact on the Upper Mississippi River, and the Refuge. This system of locks and dams (11 on the Refuge) changed the previously free flowing river to a series of shallow reservoirs from St. Louis, Missouri to Minneapolis, Minnesota.

For several decades, the newly created "pools" supported a wealth of fish, wildlife, and aquatic habitats. However, typical of dammed river systems, the initial productivity of the pools diminished significantly over time. Although water level management of the pools changed some over the years, the defining purpose for water level management was, and is, to ensure navigation pool water depths for a defined commercial navigation channel. The result is a deeper, relatively stabilized water system, especially during the summer. Over time, stable water levels have adversely affected many of the biological resources of the river, and thus the Refuge. Among the principal results have been a reduction in seasonal mudflat/sandbar areas; loss of islands; and a significant decline in aquatic plant community abundance, diversity, and distribution. Fish and wildlife dependent on these plant communities have also declined and/or moved elsewhere. Recent efforts to reverse this resource decline through pool-wide summer drawdowns show great promise, but funding levels or sources remain a limiting factor for broader application.

Invasive Plants: Invasive plants continue to pose a major threat to native plant communities on the Refuge and beyond. Invasive plants displace native species and often have little or no food value for wildlife. The result is a decline in the carrying capacity of the Refuge for native fish, wildlife, and plants. Control of invasive plants on a predominantly floodplain environment is extremely challenging due to difficulty of access and the rapid dispersal of plants. In addition, control has been hampered by staff and funding limits for basic inventory, direct control, and research into species-specific biological controls.

Invasive Animals: Invasive animal species can often be a biological storm which wreaks havoc on native plants and animals in a matter of years. Zebra mussels swept through the Upper Mississippi River incredibly fast, decimating many native mussel beds. A variety of Asian carp are poised to make a similar assault and are perhaps of most concern since they may compete directly with a large number of native fish species through direct food competition. In some areas where Asian carp have taken hold they represent 98 percent of the animal biomass. Direct control of invasive animal species is difficult in a large riverine system due to the mobility of the animals and the rich nutrient base which provides abundant food.

Wildlife and Habitat Issues

Environmental Pool Plans: As noted earlier, Environmental Pool Plans detail the desired future habitat conditions of each navigation pool of the Mississippi River. The challenge is to mesh the purposes and goals of the Refuge with these interagency plans, and to set priorities for the 15-year planning framework in the CCP within the 50-year vision of the pool plans (see Appendix O of the Final EIS/CCP for an example of Environmental Pool Plans) .

Guiding Principles for Habitat Projects: Virtually all habitat improvement projects undertaken on the Refuge are interagency in nature due to shared and overlapping jurisdictions, responsibilities, and interests. Guiding principles for projects on the Refuge are needed to provide consistency throughout the Refuge, help communicate to cooperating agen-

cies and citizens our needs and standards for project design, and help ensure that Refuge System policy is reflected.

Monitoring Fish, Wildlife, and Plant Populations: One of the directives in the Refuge Improvement Act of 1997 was to monitor the status and trends of fish, wildlife, and plants on each national wildlife refuge. Although monitoring has been a part of managing the Refuge for decades, gaps remain in baseline population data for a large number of species. A Refuge Wildlife Inventory Plan was completed in 1993 but needs updating to reflect changes in habitat, the status of many species, and new policies and procedures for monitoring. In addition, management in a changing river environment must be adaptive in nature which requires ongoing monitoring and nimble investigative capability as issues arise and change. Meeting these needs have been hampered by biological staffing and funding levels.

Threatened and Endangered Species: There are currently two federally-listed threatened or endangered species (Bald Eagle and Higgins eye pearlymussel) and two candidate species (massasauga rattlesnake and sheepnose mussel) confirmed on the Refuge. One candidate species, the spectaclecase mussel, may occur on the Refuge but there are no recent records. Threatened and endangered species are issues due to their often precarious population status, and the need for special considerations and protection which influences Refuge use and management activities.

Furbearer Trapping: Furbearer trapping on the Refuge has a long-standing tradition and has been a useful tool in maintaining balance between furbearers and habitat, and safeguarding Refuge infrastructure. The Refuge has regulated trapping within its boundaries since 1929. The existing trapping program is regulated by issuing Special Use Permits to state-licensed individuals who may use a maximum of 40 traps (all marked with Refuge tags) per day during the state season. The final day of trapping on the Refuge is no later than March 15. All trappers must submit a Fur Catch Report following the season. The 1988 Trapping Plan needs to be updated to reflect recent national policy and regulation changes governing compatibility of uses, commercial uses on Refuges, the latest furbearer population and Refuge habitat information, and new management needs.

Fishery and Mussel Management: The fishery and mussel resources of the Mississippi River are an important aspect of both federal and state management efforts due to their recreational and/or commercial value. Even prior to establishment of the Refuge in 1924, federal and state governments were actively involved in fish rescue operations in isolated backwaters, returning millions of fish to the main channel during low flow periods. Agencies were also involved in mussel propagation, and eventually regulations, due to a thriving button-making industry using mussel shells. Congressional hearings on the establishment of the Refuge included abundant testimony on the value of the area to fish, and especially the black or largemouth bass due to its sportfishing value. After Refuge establishment, the Refuge and states were still heavily involved in fish rescue operations. These efforts were curtailed after the locks and dams went into operation and higher water levels reduced the entrapment of fish in backwaters.

Changes in river ecology have had a dramatic impact on fishery and mussel resources. Many fish species dependent on a free-flowing river declined with the construction of navigation improvements, while others increased under stable pool conditions. Mussels have been impacted by pollution, harvest, sedimentation, loss of free-flowing habitat, reduction in species-specific host fish, and zebra mussels. Asian carp pose an increasing threat to both fish and mussels. Of the 35 mussel species in the Service's Region 3 Conservation Priority list, 19 are found in the Upper Mississippi River ecosystem. Several species are listed as either federally listed threatened, are candidates for federal listing, or are on state threatened and endangered species lists.

Fish and other aquatic life conservation is one of the major purposes of the Refuge. It also accounts for one of the highest public use activities on the Refuge, with more than a million fishing visits per

year. However, the Refuge has played a relatively minor role in fishery management, deferring to the states for most monitoring, management, and regulations. In 1981, the Service established a Fishery Resources Office in Winona, which was moved to La Crosse in 1995. Staff at this office are an important resource for addressing Refuge fishery questions and needs, as well as assisting other Refuges, tribes, military bases, and the states. But the La Crosse Fishery Resources Office covers a large geographic area, and with multiple responsibilities, cannot limit its activities to the needs of the Refuge. The Genoa National Fish Hatchery, located along the Mississippi River and established in 1932, also provides assistance to the Refuge primarily through limited stocking of panfish and work on threatened and endangered mussels.

The Refuge should play a larger role in fishery and mussel management in keeping with its mandated purposes and the high intrinsic, recreational, and commercial values of the resource. A Fishery and Mussel Management Plan should be in place to help communicate to the states and public the Refuge and Service perspective on fishery and mussel management issues and needs, and to help set common goals, objectives, and means of collecting and sharing information. The plan would be programmatic in nature, as the states should rightly continue to be the main lead for fishery and mussel management and regulations. The Refuge is currently hampered by having no fishery biologist on staff for full time coordination of fishery and mussel monitoring and management efforts with other Service offices, the states, and the Corps of Engineers. A fishery biologist would help ensure that fishery and mussel considerations are integrated with Refuge habitat, biological, and public use decisions.

Commercial Fishing, Clamming, and Turtle Harvest: Commercial fishing on the Refuge is an important economic use for scores of people and communities along the river. Besides its economic value, commercial fishing has strong cultural and social ties for many. In 1998, 6.27 million pounds of fish of 17 species were reported caught. Carp, buffalo, drum, channel catfish, carpsucker, and redhorse and sucker make up the bulk of the catch by pound. Commercial fishing is a viable use of a renewable resource, and it can be an important tool in reducing populations of some invasive species. However, there can be some impact to non-target species such as paddlefish, sturgeon, and diving ducks, and disturbance to rafts of waterfowl in the fall from commercial fishing activities in closed areas.

Mussel harvest, or clamming, has enjoyed a colorful history on the Mississippi River, first with a thriving button industry from the late 1800s to the 1930s, and secondly, beginning in the 1950s, with harvest to provide mussel shell "seeds" for the Japanese cultured pearl industry. The states regulate the harvest of mussels and have been moving toward standardizing regulations and reporting. Mussel harvest can be a concern due to often incomplete population information, continued environmental stressors on mussels, threatened and endangered status for some species, and enforcement challenges.

New information on turtle ecology and populations has raised questions about the effects of commercial harvest, for both the food and pet trade, on turtle populations. In 1998, the states reported a commercial catch of nearly 10,000 pounds of unspecified species on the Mississippi River.

The number of commercial operators harvesting fish, mussels, and turtles on the Refuge is not known since records kept by the states do not distinguish by pool number. However, in 1998 the total number of commercial fishermen on the Refuge was 576 and their total catch had an estimated value of nearly $8.5 million.

The Refuge has provided little to no oversight of the commercial fish, mussel, and turtle harvest on the Refuge, deferring to the states' expertise and experience. However, federal regulations state that "fishery resources of commercial importance on wildlife refuge areas may be taken under permit in accordance with federal and state law and regulations" as long as such economic use "contributes to the achievement of the national wildlife refuge purposes" and is determined to be compatible (50 CFR 31.13 and 29.1). Some Refuge oversight is thus required to ensure compliance with regulations and policy.

Turtle Management: The Refuge provides important and often critical habitat for a variety of turtle species, some of which are listed as threatened or endangered by the states. Recent surveys in the Weaver Bottoms area of Pool 5 revealed that the area harbors one of the largest and most diverse turtle assemblages in the U.S. (8 species). There are numerous potential negative and positive impacts from activities on the Refuge since turtles nest on sand areas that are also important for navigation

channel maintenance and used heavily by recreationists. Marsh and backwater areas also provide important food and cover for young turtles. More rigorous monitoring and research is needed to understand turtle populations and ecology on the Refuge, and to guide a coordinated approach to population monitoring and harvest regulations.

Forest Management: The Refuge includes approximately 51,000 acres of floodplain forests, one of the largest contiguous areas of floodplain forest in the Midwest. This habitat is critical to the river ecosystem, providing habitat for a variety of wildlife including songbirds, Wood Ducks, Bald Eagles, Red-shouldered Hawks, herons, egrets, and numerous mammals and amphibians. It also provides scenic beauty, a welcome place for recreation, protects soils, and improves water quality.

The floodplain forest of the Refuge has undergone a series of changes since Refuge establishment. A more diverse forest gave way to a more monotypic forest dominated by silver maple. The current forest is even aged, growing old, and in many cases, not regenerating itself. In many areas, reed canary grass is replacing former forest areas by choking tree regeneration. If current trends continue, there could be a marked loss of forest within the Refuge and elsewhere in the river floodplain. A baseline forest inventory plan needs to be completed as a first step in developing a management plan, or prescription, for forest health. Despite the size and importance of the forest resource on the Refuge, there are currently no foresters on staff.

Grassland Management: Although mainly a river floodplain, the Refuge does contain 5,700 acres of scattered grassland habitat important to numerous species of grassland birds and other wildlife. Some of these grasslands are tallgrass native prairie, one of the rarest ecosystems in the United States. Active management is critical to safeguard and maintain these grassland areas. Management tools include prescribed or controlled fire to setback the natural succession of shrubs and trees, and the control of invasive species.

Wildlife-Dependent Recreation Issues

General Hunting: Hunting remains an important and popular form of wildlife-dependent recreation on the Refuge. In 2003, an estimated 285,000 visits were recorded for hunting, with waterfowl hunting accounting for 87 percent. Hunting is one of the priority public uses of the Refuge System, and remains a vital part of the cultural, social, and economic fabric of the communities along the Refuge. The Refuge Hunting Plan needs revision to reflect land acquisitions and new policies.

In recent years, six administrative "No Hunting Zones" totaling 1,073 acres were established (5 on Pool 13 and 1 on Pool 7) for public safety, to reduce potential user group conflicts, and provide opportunities for wildlife observation. In addition, approximately 2,400 acres of the recently established Lost Mound Unit remains closed to all entry because of contaminant issues. These areas need to be reviewed in light of new acquisitions, and changes in public use facilities and use levels. There are several specific issues related to hunting outlined below.

Waterfowl Hunting Closed Areas: Portions of the Refuge currently designated as closed areas are actually areas closed only to hunting, furbearer trapping and camping during the duck hunting season and to migratory bird hunting at all times. They are generally open for other uses, including recreational boating and sport and commercial fishing. The only exceptions are the Spring Lake Closed Area (Pool 13) which is a sanctuary and closed to all public entry October 1 to the end of the duck hunting season, and the Goose Island No Hunting Zone (Pool 8) which is closed to hunting at all times.

The core of the current Refuge closed area system was established in 1957-58 after nearly 10 years of coordination. The system began with 14 closed areas, including Trempealeau National Wildlife Refuge, and encompassed about 41,600 acres. Considering the dominant role of the Refuge in the Mississippi Flyway migration corridor, the closed area system was established to provide migrating waterfowl with a network of feeding and resting areas, and to disperse waterfowl hunting opportunities on the Refuge. These goals were initially met.

After nearly 45 years, changes have occurred in the closed area system, including the amount and quality of habitat available, the number and species of waterfowl using the system, and the size and number of closed areas. Fewer islands and acres of plants are generally available to provide shelter, food, and cover. More diving ducks, tundra swans, and Canada Geese are now present, but fewer puddle ducks. For example, because of habitat decline, fewer mallards are using closed areas today compared to the early years of the closed area system. In addition, some waterfowl (e.g., Canvasbacks) are now concentrated in a few functioning closed areas rather than dispersed throughout the Refuge. Up to 50 percent of the continent's canvasback duck popu-

lation utilizes the Refuge, however, the vast majority of these birds are found only on Pools 7-9. An environmental accident or crash in submergent vegetation or other food sources in these pools could have serious impacts to the canvasback population.

The impact of human-caused disturbance to waterfowl concentrated in closed areas is also being reviewed. The public can motor through closed areas and fish in them during the fall migration, and new shallow water boating technology makes most areas accessible. As a result, not all closed areas are fully functional, that is, they are not providing food and rest for migrating waterfowl. Human disturbance disrupts feeding activities of waterfowl and potentially could reduce the quality of staging sites. To waterfowl, the energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid disturbance. One tool currently being used by the Refuge to address human-caused disturbance during fall migration is the Lake Onalaska Voluntary Waterfowl Avoidance Area (Pool 7). This program has been operational each year from October 15 through mid-November since 1986. Although the program has reduced disturbance, disturbance still occurs. It is also a costly and challenging program to administer in terms of buoy placement and maintenance, especially given the ice conditions that form late in the waterfowl season.

Besides providing sanctuary for waterfowl, the closed area system was also designed to provide better hunting opportunities to more people through the length of the Refuge. However, with habitat decline in many closed areas, birds are being concentrated in fewer and fewer areas, thus creating gaps in hunting opportunity. Hunters tend to congregate near concentrations of waterfowl. As a result, "firing lines" have developed along some sections of closed area boundaries. Firing lines have an increased incidence of waterfowl crippling loss. Also, firing lines create a climate of competition which fosters poor hunter behavior reducing the quality of the experience for many.

The need for modifying the closed area system was recognized as early as 1978, when the Upper Mississippi River Conservation Committee issued proposed changes to several of the Refuge closed areas (in Pools 4, 5A,8, 9, 10, 13, and 14). However, some of these changes would not be appropriate under today's habitat conditions.

Waterfowl Hunting Regulations: The Refuge provides outstanding public waterfowl hunting

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opportunities and is very popular with the public. Annual visits for waterfowl hunting are approximately 250,000. Competition for birds and hunting spots can lead to disruptive and unethical behavior among some hunters, affecting the quality of the hunt for many and having a direct impact on birds through crippling losses. There is a need to review current Refuge waterfowl hunting regulations to ensure continued hunt quality and fairness, and to minimize crippling loss.

Firing Line, Pool 7, Lake Onalaska: Hunters tend to congregate near concentrations of waterfowl. Some sections of the closed area boundary, particularly those that bisect emergent marsh, are popular and can attract large concentrations of hunters who pass shoot as waterfowl leave closed areas. One such area is the so-called Barrel Blinds area just north of the Lake Onalaska Closed Area.

Unfortunately, "skybusting," or shooting at birds out of range, often results in increased crippling loss. For example, 63 of 141 (44.7 percent) hunting parties observed by law enforcement personnel during the 1991-93 seasons hunting along firing lines in Pool 7 skybusted at least once during the time they were observed. Skybusting was defined as shooting at waterfowl at distances of 50 yards or more. The number of shots required to retrieve one bird was 11. During the 1992 hunting season, these same observers working Pool 7 firing lines and other areas, found that hunters who did not skybust had a crippling loss rate of about 27 percent for the ducks or coots they downed. The crippling loss rate for ducks and coots downed through skybusting increased to nearly 57 percent.

Hunter behavior can also deteriorate in crowded, competitive situations. Behavior observed or reported along the Barrels Blinds area includes peo-

ple claiming preferred sites by spending the night, handing-off sites to friends or co-workers after a party's hunt is over, verbal confrontations, late arriving hunters disrupting those set-up, flaring birds before they can work decoy sets, failure to retrieve birds, and increased littering.

These behaviors are not in keeping with guidance in the Refuge Manual which helps set the standard for hunting on refuges: "Refuge hunting programs should be planned, supervised, conducted, and evaluated to promote positive hunting values and hunter ethics such as fair chase and sportsmanship. In general, hunting on refuges should be superior to that available on other public or private lands and should provide participants with reasonable harvest opportunities, uncrowded conditions, fewer conflicts between hunters, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport. This may require zoning the hunt unit and limiting the number of participants."

Permanent Blinds and Decoy Sets on Savanna District: Permanent hunting blinds are wooden (dimensional lumber) structures built by waterfowl hunters and placed along some areas of the Refuge for a dry, stable hunting platform. The blind does not have to be removed at the end of the hunt season, thus it is considered a permanent structure.

In some Mississippi River areas, permanent blinds have been part of the waterfowl hunting tradition for many decades. In other Mississippi River areas, permanent blinds have been eliminated due to management problems associated with the permanent structures. In 2000, the northern Districts (Pools 4-11) of the Refuge eliminated permanent blinds and now only allow blinds to be made out of natural vegetation. Presently, only the Savanna District still allows permanent blinds.

The placement of wooden structures within the river eventually results in those materials being deposited in the river due to deterioration, floods, and ice or wind/wave action. These materials may become safety hazards for boaters.

Most permanent blinds sites are claimed year after year by the same group of individuals. This regulation promotes private exclusive use, which is inconsistent with Refuge objectives to allow equal opportunity for public recreation.

Permanent blinds limit hunting opportunities due to: a) the 200 yard spacing requirement, even for boat blinds, regardless if the blind is empty; b) no shoreline jump-shooting allowed; and c) the best hunting sites are taken year after year.

Due to an increase in new hunters to the Savanna District, confrontations and incidents related to permanent blinds have increased. Incidents include verbal threats, physical confrontations, assaults, blind burnings, and guns being pointed in a threatening manner.

Related to permanent blinds is the issue of leaving duck hunting decoys on Refuge waters in Pools 12-14 (Savanna District). This is an exception to Refuge-wide regulations which state that decoys may not be in place one-half hour after the close of legal shooting hours and 1 hour before the start of legal shooting hours. Hunters who leave decoys out overnight, and in some instances multiple days or the entire season, are in effect practicing private, exclusive or proprietary use of public waters by tying up a hunting area. This has the effect of limiting places for the general public to hunt.

Potter's Marsh Managed Hunt: Since 1980, the Savanna District has conducted a lottery drawing for waterfowl hunting blind sites on 1,923 acres of Potter's Marsh in Pool 13. Applicants pay a $10 nonrefundable application fee, and successful applicants pay an additional $100 fee for one of the 49 blind sites. Successful applicants construct blinds for the season using materials in the guidelines provided. Over 500 persons apply for a blind permit annually. In 2002, hunter bag checks showed that hunters using Potter's Marsh blinds averaged 3.8 birds/day compared to 2.9 birds/day on other areas in Pool 13.

This hunt requires more than 400 hours of staff time, annually, to answer inquiries, accept applications, collect and process fees, conduct two drawings, inspect blinds for compliance, and post the area. The time spent on this hunt detracts from other resource projects and needs. In addition, 90 percent of the hunters selected hunt less than 10 days, which is not a very high public use return for the effort involved.

The fees collected do not cover the total expenses incurred for administering and managing the hunt due to the amount of staff time required. Additionally, under new national policy implemented in 2003, only 80 percent of fees are returned to the Refuge, compared to 100 percent returned in previous years.

The random drawing process has been manipulated to the point that it is no longer an equal opportunity program. Some hunting parties hunt from the

same blind year after year and the program has evolved into private exclusive use of public lands and waters.

Blanding Landing Managed Hunt: Blanding Landing is an area within the former Savanna Army Depot that is now part of the Lost Mound Unit of the Refuge. The Illinois Department of Natural Resources conducts a managed hunt on the area with 15 hunting sites. This hunt, now on the Refuge, needs to be reviewed for consistency with other Refuge hunts and hunting issues associated with permanent blinds and administrative costs, as noted previously.

General Fishing: Fishing is an important, traditional use of the Refuge enjoyed by nearly a million visitors each year and contributes substantially to many local economies. Fishing is also one of the priority wildlife-dependent uses of the Refuge System that is to be encouraged when compatible with Refuge purposes.

The Refuge has made great improvements in facilities that promote fishing including the rehabilitation of numerous boat ramps and parking areas, dock facilities, and accessible fishing piers. In 2003 alone, work was started on five fishing piers. Maintaining fish habitat and fishing opportunity remains an important issue for anglers, businesses, and the general public.

Fishing Tournaments: Fishing tournaments, particularly for bass and walleye, are growing recreational, commercial, and fund-raising events on the Refuge. To date, the Refuge has deferred to the states for management and permitting of these events and has provided little to no oversight or review. Exact numbers of fishing tournaments are unknown since each state or other authority often has different permit and reporting requirements, or, may not issue permits at all.

There is growing concern about the impacts of fishing tournaments on other users of the Refuge. Large boats, high speeds, and the competition involved in tournaments disturb other anglers and small craft users, and can churn-up vegetation and sediment in backwaters, thus impacting fish and wildlife habitat. Increased wake action can accelerate shoreline erosion. There is some concern about the impacts of handling, holding, and later release of fish caught in tournaments, both on individual fish and overall populations.

Wildlife Observation and Photography: Wildlife observation and photography are becoming increasingly popular activities for visitors, and a source of economic growth for many communities. As two of the six priority public uses of the Refuge system, these uses are to be encouraged when compatible with the purposes of the Refuge. The Refuge provides outstanding wildlife viewing opportunities due to the abundance of eagles, swans, ducks, warblers, pelicans, herons and other birds people find unique and interesting. The National Scenic Byways which border the Refuge for hundreds of miles, and the relatively open access to lands and waters of the Refuge, make the Refuge one of the premier wildlife viewing and photography areas in the nation. The public and communities desire more opportunities for these uses, while managers must balance opportunities with the need to limit disturbance.

Interpretation and Environmental Education: Interpretation and environmental education are also priority public uses as outlined in the Refuge Improvement Act of 1997. Interpreting the resources and challenges of the Refuge to the general public and incorporating these topics into school curricula is a service welcomed by the general public, communities, and schools. The major issue facing the Refuge is how to meet the demand for these staff-intensive services, a demand which is expected to grow.

Commercial Fish Floats: Fish floats are private businesses which provide very popular fishing opportunities to the public for a fee. Operators pick up customers via boat and transport them to the fishing facility (float) below a lock and dam where fishing can be excellent. The Refuge currently allows four fish floats through an annual permit and annual fee of $100. At least one fishing float has been in operation since 1937. However, administration and enforcement of fish float operations greatly exceeds the permit fees collected. There is also a history of permit noncompliance with some operations which has increased the staff time needed to oversee the use. In 2003, three of the four fish float operations were not in compliance with one or more permit requirements. Other concerns include the condition and safety of the fish floats and compliance with policies and regulations governing for-profit concessions on a national wildlife refuge.

Guiding Services: Guiding businesses are on the rise and promise to become an increasingly common activity on the Refuge. Without proper oversight, this activity could lead to disturbance to sensitive areas and wildlife, and increase conflict with individuals or other guides as volume and frequency

increases. In addition, some guides are not in compliance with regulations designed to safeguard clients, such as Coast Guard regulations governing licensing of persons transporting the public.

Other Recreational Use Issues

Beach Use and Maintenance: There is a long history of beach use on the Upper Mississippi River as the public took advantage of beach areas created by side-channel placement of dredged sand during navigation channel maintenance operations. The creation of new beaches and additions to existing beaches came to a virtual end following a lawsuit on dredge placement by the State of Wisconsin and the subsequent Great River Environmental Action Team (GREAT) reports and recommendations.

There are basically three types of manmade or natural beach areas on the Refuge:

Remnant channel maintenance islands and shore areas formed by the side-casting of dredged sand material. These are used for a variety of day uses and the majority of camping. Some sites remain relatively open while others are nearly covered with woody vegetation.

Permanent dredged sand placement sites traditionally used by multiple boats for day and overnight mooring, camping, and other uses. These are often called "bathtubs" when in empty or part-empty state, and designated Project Operations (9-foot navigation project) in the Land Use Allocation Plan (LUAP).

Natural sand bars and shorelines which are scattered throughout the Refuge, both along the main river channel and in and around backwater areas, and used predominantly for day use and overnight mooring. Seasonal water levels often determine the number and size of these natural sand shorelines and their attractiveness to users.

The 1983 and 1987 Land Use Allocation Plans by the Corps of Engineers and the Fish and Wildlife Service identified existing beach areas as "low density recreation." This designation was in deference to the GREAT report on recreation even though on many areas beach use is very high density.

The 1987 Master Plan for the Refuge took a low-key, status quo approach to beach uses and maintenance. The objective in the Master Plan was to "provide non-wildlife traditional recreation – swimming, camping, picnicking, sunbathing," and the level was described as "maintain at levels that can be accommodated at existing beaches and at low density recreation allocation areas established by LUAPs." The Master Plan deferred to the beach plan process with the Corps of Engineers and others for exactly how the objective and level would be met.

Over the years, beach planning through interagency teams (e.g. the Recreation Work Group of the River Resources Forum) has continued with starts and stops, and rehabilitation of some beaches completed in several pools. New beach issues have emerged. These include permanent dredged material placement sites, which when emptied, create high density use areas with concerns for human-caused water quality issues and visitor safety. In addition, new information on wildlife use of beach areas, especially turtles, has raised the issue of how to balance the needs of wildlife with recreation and channel maintenance activities.

Non-wildlife-dependent recreation continues to increase on the Mississippi River and the Refuge. It is estimated that 1.3 million persons per year use the Refuge for camping, recreational boating, picnicking, swimming, social gatherings, and other uses not dependent on the presence of fish and wildlife. Proper regulation and control of these uses has been relatively absent for decades, leading to unlawful and unruly behavior, increased concern for public and Refuge Officer safety, and a general decline in the refuge experience for many users. Litter and human waste are increasing, and a lack of a clear intoxication standard has hampered law enforcement efforts, putting both individuals and others who share river traffic at risk. In addition, the Ref-

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uge does not receive specific funding for managing non-wildlife-dependent recreation, and there are no user fees to defer the costs of law enforcement, signing, planning, and access development and maintenance.

More specific problems and issues related to current beach-related uses on the Refuge include:

Refuge regulation violations can be high: dogs running loose, intoxication, illegal drugs, firearm use, fireworks, noise, human waste, littering, interference with other users, private structures, large parties, loud boats, and habitat destruction.
Public use of beaches requires a very high law enforcement effort and takes away from resource-related enforcement. There is concern for officer safety in large crowds, especially when alcohol use is involved.
Wildlife disturbance and displacement can be a problem in some areas, especially as uses move to backwater areas.
High peaks of use, both seasonally and site-specific, contribute to the above problems.
Current use may not match intended use (e.g. areas originally designed for family or small group use have become large, party areas, or, areas originally set aside for wildlife now receive heavy public use).
Many beach uses on the Refuge are non-wildlife-dependent uses and not allowed on most national wildlife refuges. Thus, these uses are inconsistent with the norm in the Refuge System. (Note: The Refuge Manual of 1982 (8 RM 9) included a special policy statement which acknowledged unique cases of non-wildlife-dependent uses on refuges, and cited the Upper Mississippi River National Wildlife and Fish Refuge as an example. The policy stated that Master Plans, or CCPs, should contain specifics on how these traditional non-wildlife-dependent activities will be managed. The compatibility standard still applies, however).

Disturbance in Backwater Areas: When the Refuge was established in 1924, the Mississippi River floodplain was a braided maze of backwater channels and sloughs. Much of this unique habitat disappeared when the locks and dams went into operation. However, in the upper reaches of many pools, this unique bottomland habitat remains and offers fish, wildlife, and people a refuge from the sights and sounds of a modern and mechanized world. Many backwater areas are preferred breeding and nesting areas for species sensitive to certain human disturbance. Also, these more remote areas of the Refuge are an important component of the river experience to many.

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Technology in the form of jet skis, bass boats, shallow water motors such as Go-Devils™, airboats, and hovercraft has made the shallow backwaters of the Refuge accessible to more and more people, and introduced more and more noise, wildlife disturbance, and user conflict. The declining opportunity to experience the quiet and solitude of the backwaters was cited by citizens during scoping meetings.

Slow, No-Wake Zones: On a few areas of the Refuge, boat traffic levels and size of boats is leading to erosion of island and shoreline habitat. Some areas also present a safety hazard for boaters due to level of use and blind spots in the channel. The addition of slow, no-wake zones needs to be reviewed to protect visitors and the environment.

Dog Use Policy: Unless specifically authorized, national wildlife refuges are closed to dogs, cats, livestock and other animals per federal regulations (50 CFR 26). Domestic animals can harass and kill wildlife, and at times become a direct threat to other persons engaged in recreation. Current regulations have been confusing since they prohibit unconfined domestic animals, but the term unconfined was

never well-defined in the regulation, leading to various interpretations by the public and inconsistent enforcement by the Refuge.

However, there is a strong tradition of people using the waters of the Refuge for working and exercising dogs, especially retrievers. The size, configuration of lands and waters, and relative remote nature of the Refuge lends itself to considering a reasonable approach to dog use. The public desires a new regulation that will ensure public safety and minimal disturbance to wildlife, while providing the option of working with dogs, especially hunting dogs, which are often an integral part of the traditions and enjoyment of hunting.

General Public Use Regulations: The current public use regulations were last reviewed and updated in 1999. Regulations need to be reviewed to address new laws and policy and to help correct problems or circumstances unique to the Refuge and not specifically or sufficiently covered in current regulations or the regulations governing the National Wildlife Refuge System (50 CFR, subchapter C part 26). Refuge law enforcement officers, and the public, need to understand clearly what is and is not allowed on the Refuge.

Administration and Operations Issues

Administration, Operations, and Public Awareness: With approximately 240,000 acres over 261 miles and 3.7 million annual visits, managing and administering the refuge is a huge undertaking requiring staff and funding for programs, facilities, and equipment. Plans and planning need to articulate these needs and ensure they are represented in databases and other documents which are used in budget decision-making at the national and regional level. Current staffing levels are below essential staffing standards and reflect gaps between what should be done and what can be done.

There is a lack of adequate office, maintenance, and visitor contact facilities. Office facilities at the Headquarters of the Refuge, and on some of the Districts, are woefully inadequate to meet the needs of employees and the visiting public. The Headquarters and Winona District offices are located in a quaint but ancient building with unreliable heat, plumbing problems, inadequate parking, inadequate disabled access, and no public information or interpretive facilities. The McGregor District has a tiny office with unsafe access off a major highway, and limited onsite parking. Some staff offices, files, and a makeshift conference/meeting room at McGregor are in a surplus trailer adjacent to the existing building, and a small maintenance facility is crammed on the same lot. The La Crosse District has an excellent rented office/garage, but space is limited and it is located in a dense retail business area some distance from the Refuge. Savanna District has a new office but expansion is needed for environmental education. New maintenance shops are scheduled to be built at Winona and Savanna, but others are needed at McGregor and La Crosse. Eventually, an office and shop will need to be constructed at the Lost Mound Unit, Savanna District.

The future well-being of the Refuge is tied to the public's awareness of its existence and significance. Many river visitors do not know they are on a national wildlife refuge, and the public as a whole is not aware of the ecological and social significance of the Refuge. As public lands and waters, the public desires information on opportunities their national wildlife refuge provides them, as well as the challenges to be addressed.

Chapter 2: Consultation and Coordination With the Public and Others

Scoping and Public Involvement

Scoping and public involvement are vital components of federal planning and were given considerable attention during development of this CCP. The public received our official notice of intent to prepare an EIS/CCP via the Federal Register, dated May 30, 2002 (Vol. 76, No. 104, page 37852). All public meeting dates and locations, with notes from workshops, are available at Refuge headquarters in Winona, Minnesota or on the planning website: http://www.fws.gov/midwest/planning/uppermiss

All public meetings were video recorded by Refuge staff; recordings were transferred to Digital Video Discs (DVDs) that are stored at headquarters in Winona, Minnesota. Outreach Plans were compiled prior to an interagency coordination meeting in January 2004 and before public release of the Draft EIS/CCP in May 2005. These plans identified immediate issues, facts, communication goals, key messages, interested parties, and actions to be taken by Service personnel. Updates to the second plan were made throughout the remainder of the planning process.

Internal Scoping

Internal scoping was conducted between March and June 2002, within each of the four Refuge districts and the Regional Office, with over 350 concern statements recorded. Many of these concerns were repeated at each setting which helped focus on the most important issues. An in-house, 1-day workshop was conducted at a Refuge-wide meeting in January 2004. Refuge staff discussed issues and potential solutions for use in EIS/CCP preparation.

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Public Scoping Meetings and Workshops

Ten public scoping meetings, professionally facilitated by Dr. Onnie Byers and Kathy Holzer of the Conservation Breeding Specialist Group, Apple Valley, Minnesota, were attended by 473 citizens during August and September 2002. Citizens expressed 495 comments in response to the question, "What concerns you most about the future of the Refuge?" Approximately 35 additional written comments were received as a result of those meetings.

Upon completion of these public meetings, Refuge staff compiled a series of 12 "Issue Fact Sheets" summarizing major habitat and recreational issues identified by the public. These one-page documents were used as reference materials for public workshops held in Prairie du Chien, Wisconsin; Savanna,

Figure 2: Public Involvement Timeline

Illinois; Winona, Minnesota; and Onalaska, Wisconsin between January and March 2003. Called "Manager for a Day" workshops, citizens were invited to offer potential solutions to the 12 issues referred to above and any other issue they wished to address. These workshops were again facilitated by Dr. Byers and yielded hundreds of ideas and potential solutions from 116 citizen participants.

In anticipation of public concerns about waterfowl hunting and areas closed to waterfowl hunting on the Refuge, we conducted two special "Closed Area Informational Meetings" with the public. The first was in Onalaska, Wisconsin in September 2003, and the second was in Savanna, Illinois in June 2003. Staff made presentations on the history of closed areas, human disturbance issues, and the bioenergetic or food needs of waterfowl. Citizens provided pros and cons of management options in and around closed areas. Total attendance at these meetings was 93.

Public Meetings and Workshops to Review Draft EIS/CCP, Alternatives A-D

The Draft EIS/CCP was released for public review May 1, 2005, for a 120-day comment period ending August 31, 2005 (Notice of Availability published in the Federal Register: Vol. 70, No 81, page 22058). The Refuge hosted 21 public meetings and workshops attended by 2,900 people. Due to high public interest, we announced the intent to issue a new preferred alternative following the comment period to reflect input received. The workshops resulted in 87 workgroup reports with comments or recommendations on major issues. Each report was posted on the Refuge planning web site. The Refuge also received 2,516 written comments including comments from the four states involved, the Corps of Engineers, and 40 conservation or recreation-related organizations, and 5 petitions with more than 3,000 signatures.

Public Meetings and Open Houses to Review Preferred Alternative E

A new preferred alternative (Alternative E) was issued as a Supplement to the Draft EIS/CCP on December 5, 2005 (Notice of Availability published in the Federal Register, Vol. 70, No. 232, page 72462). The initial comment period was for 60 days but was extended to 90 days ending on March 6, 2006. Nine open houses / public forums were held in January 2006 to discuss provisions of Alternative E

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with the public. A total of 888 citizens attended these meetings. The Refuge received 714 written comments on Alternative E from citizens, clubs, organizations, legislators and state and federal agencies.

State and Federal Interagency Meetings

Refuge managers and biologists have worked closely with the departments of natural resources for Illinois, Iowa, Minnesota and Wisconsin and the Corps of Engineers (St. Paul and Rock Island Districts). Throughout the planning process, Refuge personnel have met with State representatives approximately 35 times, in person or via conference calls. An official CCP Interagency Planning Team consisting of State and Corps of Engineers representatives was first convened in December 2001, followed by scoping meetings in May 2002, March 2003, and January 2004. Most representatives also participated in a Wildlife and Habitat Management Review of the refuge in August and October 2002.

Between January and April 2004, Refuge staff conducted briefings for state department of natural resource personnel from the four States and managers of the Rock Island and St. Paul Districts, Corps of Engineers. These briefings involved discussions of issues and management alternatives for the Draft EIS/CCP.

As planning progressed, the Refuge continued to meet with the Interagency Planning Team in person or via conference calls in May 2005, September 2005, February 2006, and May 2006. These meetings provided the agencies further opportunity to exchange ideas regarding proposed management alternatives.

The Refuge provided briefings to the Corps of Engineers and each state department of natural resources after releases of the Draft EIS/CCP in May 2005 and the Supplement in December 2005. Briefings were scheduled after public meetings (see above) in order to integrate public comments into the discussion. These briefings often included PowerPoint presentations of major issues, followed by questions and answers and discussion.

Congressional Briefings and Meetings

In late January 2004 the Refuge conducted three briefings for Congressional and state legislative members and staff. Meetings were held in Savanna, Illinois, Prairie du Chien, Wisconsin, and La Crosse, Wisconsin. Attendees included one state senator from Minnesota and staffers for three U.S. Representatives and three U.S. Senators. In August and November 2005, Refuge Manager Hultman provided a briefing to the Congressional River Advisory Board, sponsored by Congressman Kind (WI). Meetings were also held with Congressman Kind in March and April of 2006. Conference calls were conducted with Congressional Staff in October 2005 and May 2006. In October 2005, two of Senator Coleman's (MN-R) staff visited the Refuge to discuss the CCP. In March 2006, Refuge Manager Hultman attended a meeting convened by Congressman Kind to discuss Wisconsin navigability issues. Attendees included legal counsel for Department of the Interior, Wisconsin Department of Natural Resources, and Wisconsin Department of Justice (Attorney General).

Other Meetings

Between 2003 and 2006, briefings and presentations were given to the Upper Mississippi River Conservation Committee, Upper Mississippi River Basin Association, Mississippi River Citizens Commission, Wisconsin Parkway Commission, Minnesota Audubon Society, Mississippi River Air Boaters Association, the La Crosse County (Wisconsin) Conservation Alliance, Winona Civic Association, and several other river community organizations. Topics included the planning process and framework, issues being addressed, and avenues for public involvement and comment.

Newsletters, News Releases and Executive Summaries

Three "CCP Update" newsletters dated August 2002, December 2002, and July 2003, were sent to approximately 2,600 citizens, nongovernmental organizations, media, and legislators during the scoping process. They described who we are, the planning process, proposed completion schedules, potential issues to be addressed in the Draft EIS/CCP, draft Refuge vision and goals, and times and locations of upcoming public meetings. Four news releases were sent to approximately 52 media outlets (newspapers, radio, and TV) during this scoping process. They announced our intent to complete the CCP, meetings, workshops and invited citizen participation.

In May 2005 the Draft EIS/CCP was released for public review and comment. At the same time, an Executive Summary (27 pages) was mailed to over 3,100 individuals, organizations, elected officials, and members of the media. It provided information on the public involvement process, Refuge goals, planning issues, summaries of alternatives and environmental consequences, and tables of project features proposed in the Plan. Several news releases were issued at the same time to announce the release, comment deadlines, and upcoming pubic meetings.

In December 2005, an Executive Summary of the "Supplement to the Draft Environmental Impact Statement and Comprehensive Conservation Plan, Alternative E: Modified Wildlife and Integrated Public Use" was sent to a mailing list including 2,950 addresses. This document offered information similar to the previous summary, with the addition of foldout maps of each Refuge pool showing management direction under proposed Alternative E. As

with previous executive summaries, news releases were issued at the same time to announce the release, comment deadlines, and upcoming pubic meetings.

An update of the Final Environmental Impact Statement and Comprehensive Conservation Plan was sent to approximately 4,900 addressees on the current EIS/CCP mailing list.

General

Details of public and agency meetings are available at Refuge headquarters in Winona, Minnesota and on our planning website. Throughout the planning period, 2002-2006, Refuge staff made numerous CCP presentations to a variety of media and audiences, including radio, television, and print media, civic organizations, conservation groups, and other organizations.

Refuge staff provided briefings to the Service's Regional Office (Region 3, Twin Cities MN) in May 2003, November 2003, February 2005, September 2005, and March 2006. Similar briefings were provided to the Service Director and staff and high-ranking officials of the Department of the Interior, in Washington, D.C. in March 2005 and April 2006.

Cultural Resources and Historic Preservation

Notification of preparation of the CCP and EIS was sent to the federally-recognized tribes and to several county historical societies. In addition, the following listed organizations were notified:

State Historic Preservation Officer for Illinois, Iowa, Minnesota, and Wisconsin
Office of the State Archeologist for Iowa, Minnesota, and Wisconsin
Governor's Liaison for Indian Affairs in Iowa
Indian Affairs Council for Minnesota
Archaeological and historic preservation statewide groups
The Advisory Council on Historic Preservation
The FWS Historic Preservation Officer

The CCP will also be be sent to each State Historic Preservation Officer and to others who request it.

List of Contacts

The Refuge has contacted the following agencies, organizations, and citizens regarding the CCP.

Elected Federal Officials (18)

U.S. Sen. Richard Durbin (Illinois)
U.S. Sen. Barack Obama (Illinois)
U.S. Sen. Charles Grassley (Iowa)
U.S. Sen. Tom Harkin (Iowa)
U.S. Sen. Norm Coleman (Minnesota)
U.S. Sen. Mark Dayton (Minnesota)
U.S. Sen. Russ Feingold (Wisconsin)
U.S. Sen. Herb Kohl (Wisconsin)
U.S. Rep. Melissa Bean (Illinois)
U.S. Rep. Lane Evans (Illinois)
U.S. Rep. Dennis Hastert (Illinois)
U.S. Rep. Donald Manzullo (Illinois)
U.S. Rep. Tom Latham (Iowa)
U.S. Rep. Jim Nussle (Iowa)
U.S. Rep. Gil Gutknecht (Minnesota)
U.S. Rep. Mark Kennedy (Minnesota)
U.S. Rep. Mark Green (Wisconsin)
U.S. Rep. Ron Kind (Wisconsin)

Elected State Officials (36)

State Sen. Denny Jacobs (Illinois)
State Senator Todd Sieben (Illinois)
State Sen. Mike Connolly (Iowa)
State Sen. E.T. Gaskill (Iowa)
State Sen.Sen. Kitty Rehberg (Iowa)
State Sen. Julie Hosch (Iowa)
State Sen. Bryan Sievers (Iowa)
State Sen. Roger Stewart (Iowa)
State Sen. Mark Zieman (Iowa)
State Sen. Bob Kierlin (Minnesota)
State Sen. Steve Murphy (Minnesota)
State Sen. Ron Brown (Wisconsin)
State Sen. Dan Kapanke (Wisconsin)
State Sen. Mark Meyer (Wisconsin)
State Sen. Dale Schultz (Wisconsin)
State Rep. Mike Boland (Illinois)
State Rep. Jim Sacia (Illinois)
State Rep. Patrick Verschoore (Illinois)
State Rep. Polly Bukta (Iowa)
State Rep. Chuck Gipp (Iowa)
State Rep. Pam Jochum (Iowa)
State Rep. Steven Lukan (Iowa)
State Rep. Pat Murphy (Iowa)
State Rep. Steven Olson (Iowa)

State Rep. Bob Osterhaus (Iowa)
State Rep. Roger Thomas (Iowa)
State Rep. Gregory Davids (Minnesota)
State Rep. Jerry Dempsey (Minnesota)
State Rep. Gene Pelowski (Minnesota)
State Rep. Steve Sviggum (Minnesota)
State Rep. Barbara Gronemus (Wisconsin)
State Rep. Mike Huebsch (Wisconsin)
State Rep. DuWayne Johnsrud (Wisconsin)
State Rep. Gabe Loeffelholz (Wisconsin)
State Rep. Lee Nerison (Wisconsin)
State Rep. Jennifer Shilling (Wisconsin)
Attorney General Peg Lautenschlager (Wisconsin)

Federal Agencies (8)

U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of Agriculture, Natural Resource Conservation Service
U.S. Department of Interior, U.S. Fish & Wildlife Service
U.S. Department of Interior, U.S. Geological Survey
U.S. Department of Transportation
U.S. Environmental Protection Agency
U.S. Forest Service

Native American Tribes (35)

Bad River Band, Chippewa
Boise Forte Band, Chippewa
Fond du Lac Band, Chippewa
Grand Portage Band, Chippewa
Lac Courte Oreilles Band, Chippewa
Lac du Flambeau, Chippewa
Leech Lake Band, Chippewa
Mille Lacs Band, Chippewa
Red Cliff Band, Chippewa
Red Lake Band, Chippewa
Sandy Lake Band, Chippewa
Sokaogon Chippewa
Devils Lake (Spirit Lake) Sioux
Flandreau Santee Sioux
Lower Brule Sioux
Lower Sioux Mdewakanton
Prairie Island Sioux
Santee Sioux
Shakopee Mdewakanton Sioux
Sisseton-Whapeton Sioux
Upper Sioux Community
Iowa Tribe of Kansas
Iowa tribe of Oklahoma
Menominee Indian Tribe
Miami Tribe
Stockbridge-Munsee
Peoria Indian Tribe
Citizen Potawatomi
Forest County Potawatomi
Hannahville Indian Community, Potawatomi
Prairie Band of Potawatomi
Sac & Fox Nation of Missouri
Sac & Fox Tribe of the Mississippi
Ho-Chunk Nation
Winnebago Tribe of Nebraska

State Agencies (16)

Iowa Department of Natural Resources
Iowa Historical Society
Iowa Department of Cultural Affairs
Illinois Department of Natural Resources
Illinois Historic Preservation Division
Minnesota Department of Agriculture
Minnesota Department of Natural Resources
Minnesota Department of Transportation
Minnesota Historical Society
Minnesota Pollution Control Agency
Minnesota Water & Soil Resource Board
Wisconsin Department of Natural Resources
Wisconsin Division of Tourism
Wisconsin Department of Transportation
Wisconsin Department of Agriculture, Trade
Wisconsin Historical Society

Cities (23)

Alma, Wisconsin
Brownsville, Minnesota
Cassville Village, Wisconsin
Dubuque, Iowa
Edgewood, Iowa
Elkader, Iowa
Fountain City, Wisconsin
Garnavillo, Iowa
Guttenberg, Iowa
Harper's Ferry, Iowa
Hokah, Minnesota
La Crescent, Minnesota
La Crosse, Wisconsin
Lansing, Iowa
McGregor, Iowa
Monona, Iowa
New Albin, Iowa

Onalaska, Wisconsin
Prairie du Chien, Wisconsin
Stoddard, Wisconsin
Trempealeau, Wisconsin
Waukon, Iowa
Winona, Minnesota

Counties (19)

Carroll, Illinois
Jackson, Illinois
JoDaviess, Illinois
Rock Island, Illinois
Whiteside, Illinois
Allamakee, Iowa
Clayton, Iowa
Clinton, Iowa
Dubuque, Iowa
Scott, Iowa
Houston, Minnesota
Wabasha, Minnesota
Winona County, Minnesota
Buffalo, Wisconsin
Crawford, Wisconsin
Grant, Wisconsin
La Crosse, Wisconsin
Trempealeau, Wisconsin
Vernon, Wisconsin

Organizations (262)

American Kennel Club
American Rivers
Animal Protection Institute
Audubon Society
BASSMasters Federation
Blue Goose Alliance
Boy Scouts of America
Defenders of Wildlife
Izaak Walton League of America
National Rifle Association
Sierra Club
The Nature Conservancy
The Wilderness Society
Friends of the Upper Mississippi Refuges
Conservation Organizations and Clubs (96)
Businesses (45)
Schools/Univ. (26)
Libraries (58)
Other Organizations (54)

River Associations and Committees (13)

Lower Mississippi River Conservation Committee
Midwest Area River Coalition 2000
Mississippi River Basin Alliance
Mississippi River Citizen Commission
Mississippi River Interstate Cooperative Research Association
Mississippi River Parkway Commission
Mississippi River Regional Planning Commission
Mississippi River Revival
River Resource Alliance
Upper Mississippi River Basin Association
Upper Mississippi River Congressional Task Force
Upper Mississippi River Conservation Committee
Upper Mississippi Waterway Association

Media (119)

Newspaper (75)
Radio (28)
TV (16)

Citizens (3,907)

Illinois (526)
Iowa (665)
Minnesota (945)
Wisconsin (1,715)
Citizens of Other States (56)

Chapter 3: Affected Environment

Physical Environment

The Upper Mississippi River National Wildlife and Fish Refuge (Refuge) encompasses one of the largest blocks of floodplain habitat in the lower 48 states. Bordered by steep wooded bluffs that rise 100 to 600 feet above the river valley, the Mississippi River corridor and Refuge offer scenic beauty, a wild character, and productive fish and wildlife habitat unmatched in mid-America. The Refuge covers 240,220 acres and extends 261 river miles from north to south at the confluence of the Chippewa River in Wisconsin to near Rock Island Illinois.

While extensive wetland habitat losses have occurred well beyond its boundaries in neighboring states, the Refuge has retained much of its biological integrity and is a stronghold of bottomland forests and wetlands vital to breeding and migrating fish and wildlife. Nonetheless, Refuge wetland habitat has degraded significantly over the past 40 years due to human influence and natural processes.

The Refuge is one of several management entities on the Mississippi River. The U.S. Army Corps of Engineers operates the 9-foot navigation project within the Upper Mississippi River System (Public Law 99-662), and overlays the entire Refuge. The navigation project provides a continuous channel for barge traffic through a series of reservoirs created by 29 locks and dams on the Mississippi River and eight on the Illinois River. These reservoirs (pools) create and maintain most of the Refuge's floodplain habitat. The Refuge occurs in Pools 4 through 14.

In addition to Corps and Refuge ownership, the adjoining states of Iowa, Illinois, Minnesota, and Wisconsin own wildlife management units within the floodplain. Many of the 70 counties, towns and other municipalities adjacent to the Refuge have property within the floodplain as well. With all these entities

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having divergent roles and interests in River management, Congress declared in the Upper Mississippi River Management Act of 1986 that the Upper Mississippi River is both a nationally significant ecosystem and nationally significant commercial navigation system.

Over the past 40 or more years, scientists, managers and other writers have produced an extensive amount of literature addressing the physical, biological, and cultural resources and challenges of the Mississippi River and the Refuge (GREAT I and II, UMRBC Master Plan, Navigation Project EIS, Status and Trends Report, Refuge Master Plan and EIS, local studies, etc). This CCP will make brief summaries and references to these documents; refer to Appendix F, Literature Cited, for details.

Geomorphology – Effects of Water, Wind and Ice

The Refuge lies within the Mississippi River floodplain, an ancient river valley filled with alluvial

material (mud, sand, and gravel) carried and deposited by surface water. The river and its tributaries traverse sedimentary rock formations (dolomite, sandstone, and shale) that accumulated under inland seas during the early Paleozoic Era about 400 to 600 million years ago (Fremling and Claflin, 1984).

In more recent geologic times, the river valley has taken shape due to the presence (and absence) of glacial action. Global warming ended the last period of glaciation, about 12,000 years ago, and melted glaciers created huge clear-water lakes. Glacial Lake Agassiz covered much of northern Minnesota, the Dakotas, and central Canada. Most of that lake emptied to the south via the River Warren through which water ran in torrents for about 3000 years, trenching the Mississippi River valley by as much as 200 feet (Fremling and Claflin, 1984). Once the flow from glacial lakes subsided, the river lost much of its velocity and sediment transport capabilities. Sediment deposition ensued, and the valley partially refilled with sand and gravel. Several episodes of flushing and filling of the river valley have followed. Sand terraces that presently flank the river valley are remnants of ancestral floodplains not scoured during the most recent postglacial floods.

Today, over 30,700 miles of streams course through the basin, merge, and eventually enter the Upper Mississippi River Basin (Figure 3). That number does not include many smaller streams not detected by large-scale mapping techniques (Gowda, 1999). The Refuge receives water from 530 of the estimated 1300 streams that occur within the Upper Mississippi River Basin. The illustration of sub-basins by stream order helps depict the relative size of drainage areas and channel lengths. The ordering system (Strahler, 1957) starts with the uppermost channels in a drainage network, they are the first-order streams downstream to their first confluence. A second-order stream is formed below the confluence of two first-order channels. Third-order streams are created when two second-order channels join, and so on. "Tributaries of the Mississippi have steeper gradients than the master stream and they now deliver sediments faster than the Mississippi can remove them; thus the valley floor is slowly agrading once more" (Fremling and Claflin, 1984).

Much of the Refuge follows the Mississippi River as it flows through the carved Driftless Area, a non-glaciated "island" within a huge area of central North America shaped by a series of glaciers (Albert, 1995). This region has minimal amounts of glacial deposits known as "drift" and is therefore known as the Driftless Area. This landscape features a combination of steep, exposed bluffs and eroded ravines that bound the wide floodplain of the Upper Mississippi River, creating an unmatched wild and scenic character so prized by many viewers. The blufftops mark the edge of a plateau, extending many miles from the river, that is capped with loess soils that range in depth from 2 to 20 feet, the thinnest being along the valley walls. The Driftless Area includes parts of southwest Wisconsin, southeast Minnesota, northeast Iowa, and northwest Illinois. It also is called the Blufflands or Paleozoic Plateau.

Land Use Characteristics of the Upper Mississippi River Basin

The Upper Mississippi River Basin is a major sub-basin of the entire Mississippi River. It includes approximately 800 miles of river and covers 189,189 square miles, about 15 percent of the entire Mississippi River Basin. More than 60 percent of the land area in the Upper Mississippi River Basin is devoted to cropland or pasture. Between 1945 and 1985, the application rate of commercial fertilizers increased twenty-fold and contributed to nutrient enrichment of the river. The Upper Mississippi River Basin accounted for 31 percent of the total nitrogen delivered from the Mississippi River to the Gulf of Mexico between 1985 and 1988, despite being only 15 percent of the entire basin's land area (Gowda, 1999).

Sediments, nutrients, and pesticides that erode from urban and agricultural lands enter the Mississippi River by many streams. "Because of modern urban and rural drainage networks (tiles, ditches, culverts, etc.), water reaches the rivers [of the basin] more quickly, with greater velocity, and at higher stages than in the past (Bellrose et al., 1983)." Nitrogen and herbicides arrive in pulses that coincide with snow melt, spring rains, and planting and growing seasons. Average soil loss in the Upper Mississippi River Basin is 4.4 tons per acre per year. In 1993, a very wet year, Iowa annual losses approached 20 tons per acre per year (Bhomilk, 1996).

Agricultural practices of the recent past caused extensive erosion of sediments that reached the river and were transported downstream. However, some of these sediments remain in tributary chan-

Figure 3: Watersheds of the Rivers and Streams that Impact Upper Mississippi River Refuge

nels and deltas, and thus "present a major problem because treatment to reduce soil erosion on land may not benefit the river until stored sediments are transported by high flows (Gowda, 1999)".

Researcher Prasanna Gowda states, "we do know that basin-level factors (sedimentation, nutrient enrichment, pollution) have degraded environmental quality in the river floodplain and beyond. Previous and ongoing studies have identified land-use practices that create high rates of erosion and runoff. Land management agencies could use this information to implement increasingly cost-effective measures to retain soil and contaminants in the uplands (Gowda, 1999)."

Locks and Dams and River Reaches

People began making structural changes to enhance navigation on the Mississippi River during the 1830s when a 5-foot channel was blasted through the Des Moines Rapids (Theiling, 1999). Snags were pulled, wing dams installed, and channels dredged to 4, 4.5, and 6 feet deep between 1866 and 1907. The current structure originated in 1930 when Congress authorized the 9-foot navigation channel project for the Upper Mississippi River System to be constructed, operated, and maintained by the U.S. Army Corps of Engineers. This navigation system, including 29 locks and dams on the Mississippi River and eight on the Illinois River, has brought the most significant change to the river ecosystem since European settlement (Figure 4). The Refuge occurs within Pools 4-14.

The navigation dams were installed by the late 1930s and created a stairway of reservoirs (navigation pools) from Minneapolis, Minnesota, to St. Louis, Missouri, allowing boats and barges to pass obstacles and readily traverse this 400-foot elevation gradient and 670 mile stretch of the Mississippi River. The navigation pools permanently raised water levels and inundated thousands of acres of floodplain habitat (Figure 5). The newly created backwater wetlands and shallow lakes immediately supported an abundance of fish and wildlife adapted to this new water regime. Some existing plant and animal species did not survive the change, including some migratory fish and associated mussels.

With time, floodplain productivity has declined because sediments from the uplands have filled backwaters, floods and river currents have eroded away plant beds and islands, and relatively stabilized water levels have eliminated natural processes of drying and flooding, key ingredients to maintaining highly productive wetlands.

In order to evaluate habitat needs, the Upper Mississippi River System is categorized into 12 dominant geomorphic areas, or river reaches. The Refuge occurs in Reaches 2-5, or Pools 4-14 (USACE, 2000). The first three reaches (2, 3, 4), Pools 4-13 of the Refuge, are characterized by many braided channels and a mix of open water, aquatic vegetation, floodplain forest, some agricultural and urban areas, numerous islands, and a narrow floodplain (about 1 to 3 miles) that terminates at steep bluffs. The fifth Reach (including Pool 14 of the Refuge) is dominated by agriculture, with occasional floodplain forest and wetland habitats.

Hydrology and Water Quality

Hydrology and water quality play a vital role in maintaining the ecological integrity of the Refuge, a national treasure. A rich assemblage of species requires an appropriate mix of physical, chemical and biological features, such as water flow and depth, adequate but not excessive nutrients in the substrate, appropriate temperature, oxygen and light levels, food sources and escape cover.

Water quantity and quality within the Upper Mississippi River Basin and the floodplain go to the very heart of the conservation conundrum of the Refuge. Besides trying to deal with an increasing array of environmental degradation symptoms, it is important to trace the problems to their sources for long-term solutions. Monitoring on the river has demonstrated that some forms of pollution have actually declined since the federal Water Pollution Control Act was passed in 1972, mandating the secondary treatment of sewage effluents.

However, the river and the Refuge are still being exposed to biotic risks and threats from a growing array of agricultural chemicals and their degradation products, excess nutrients from both point and non-point sources, dissolved heavy metals in water and sediment, and other toxic compounds or invasive organisms.

Water flow within the entire basin is influenced by agriculture, urban development and even the thousands of reservoirs installed throughout the basin. The Corps of Engineers has 76 reservoirs, holding 40 million-acre feet of water; this volume would take three months to flow past St. Louis at average discharges (Wlosinski 1999). An estimated 3,000 more reservoirs with unknown capacity also occur in the basin.

Figure 4: Upper Mississippi River Navigation System with Locks and Dams numbered; Navigation Pools Occur Above Each Lock (Source: Lubinski, 1999)

Figure 5: Typical Floodplain and Bluff Habitats of the Upper Mississippi River[1]

1. *Source: J.C. Nelson, Illinois Natural History Survey, Great Rivers Field Station, Alton, IL. In Theiling, 1999)*

Wetland drainage has affected 26 million acres in the Mississippi River Basin. An estimated 34 to 85 percent of wetlands have been lost in Wisconsin and Minnesota and 85 to 95 percent in Iowa and Illinois (Dahl 1990). These losses are critical because wetlands help regulate hydrology (water movement to tributaries), they filter nutrients from the water, and sustain highly diverse plant and animal populations.

Flow on the mainstem of the Mississippi and Illinois Rivers has been altered by installation of 37 dams, thousands of wing dams, and 8,000 miles of levees. Since 1933, the long-term average hydrologic pattern on the Upper Mississippi River System shows an approximate 11-year cycle of low and high flow, an apparent long-term increase in flow, and an increase in the frequency and amplitude of multiyear fluctuations in flow. Flood heights have increased and the number of days water elevations are above flood stage is increasing; present day floods on the Mississippi River at St. Louis tend to be 9 feet higher than historic floods at the same discharge (780,000 cfs). Major floods at St. Louis now occur once every six years (Wlosinski 1999).

The lock and dam system has permanently inundated lands previously rejuvenated through annual drying and "flood pulse" cycles. While initially the pools supported flourishing, productive wetlands, within a few decades the vast marshes became decadent as they filled with fine sediments, and turbidity from rough fish and wave action suppressed growth of aquatic plants. To compensate for degradation, attempts are now being made to simulate natural cycles of drought with periodic drawdowns and to assist island or channel creation with specially designed habitat projects in cooperation with the Corps of Engineers and the states.

Improved agriculture and development practices can significantly reduce the rates of sediment, nutrient and chemical contaminant delivery and deposition within the Refuge. This translates to better quality habitat for a wider array of species. Progress has been made, but much more can be done. The link between fish and wildlife health, water quality, and inputs from the basin or watershed is well documented. The Refuge has a role in promoting the use of cost-effective measures in the watersheds to enhance its fish and wildlife resources.

Soils

Much of the Upper Mississippi River Basin is covered by loess, a silty soil deposited by postglacial winds. These soils form a mantle over half the Upper Mississippi and Illinois sub-basins and serve as a major source of silt to the Upper Mississippi River System (Nielsen et al., 1984). Floodplain bedrock is covered by up to 150 feet (Pool 10) of alluvial soils (clay, silt, sand and gravel). Soils within the pools vary from silty clay to sand. Sand terraces, occurring at slightly higher elevations bordering the floodplain of the Mississippi and its larger tributaries, consist of glacial outwash deposited during periods of higher average flow.

The soils of the Refuge floodplain from Pools 4 through 6 are alluvial in origin, and vary in texture from silty clay to sand. The composition of the soil at any particular location depends upon the manner in which it was deposited. These irregular strata are composed of clay, silt, sand and gravel. The sands and gravels border many sloughs, while heavy silt loams underlain by sand or gravel can be found on higher terrain between sloughs. Before impoundment and refuge creation, these elevated areas supported bottomland timber, or were cleared and managed for hay or pasture.

Soils of Pools 7 and 8 are derived from a wider variety of parent material, ranging from weathered bedrock to glacial till, alluvium and loess. The weathering of the predominant till has taken place under different vegetative influences, resulting in several soil types. Podzolic soils have formed under deciduous trees with grass cover. The bog soils are represented by muck and peat, formed by decomposition of sedges and grasses at the wet lower margins of sand terraces exposed by river meanders. Regisols consist of deep, soft mineral deposits. Alluvial soils consist of water-borne materials recently deposited on the floodplain. A loess cap of silty particles covers most of the parent material.

Pool 9 parent materials also include loess, alluvium and drift. Pockets and fans of glacial outwash were formed as ice melted at the end of the most recent glacial period, known as the Wisconsin epoch. The main soil associations are Fayette-Dubuque-Stonyland, or "FDS." The FDS association is characterized by a high percentage of shallow limestone soils over steep slopes that are susceptible to erosion. Sediment subsequently delivered to Pool 9 by the Upper Iowa River causes extensive siltation in backwaters and channels. The primary soil type of islands and upland peninsulas in this area is

Dorchester silt loam, which is a light-colored soil that lacks a B-horizon. It forms on relatively flat sites over black soils that are usually flooded annually after spring thaw or after heavy rains.

Some of the high terraces bordering Pool 10 have sandy loam soils developed under prairie or savanna vegetation. The bottomlands have diverse soils of alluvial origin that are composed of sand, silt and clay layers deposited by flood events. In areas of annual flooding, there is little soil development, since humus is mostly removed or covered. Higher elevation terraces may have a thin layer of humus over sandy material. A grey layer of sticky, fine clay with blue-green mottling from reduced iron is present on bottomland soils, indicating poor internal drainage and anaerobic soil conditions. Soils information for navigation pools 4-10 was obtained from the Mississippi River Operational Management Plan (USACE, 1993).

In the lower portion of the Refuge (pools 11-14), three major zones are identified for the river ecosystem in the current Operational Management Plan of the Corps of Engineers, Rock Island District: the streamside buffer zone, a higher elevation natural levee zone, and a lower elevation floodplain zone.

The buffer zone is an area close to the stream bank that is distinguished by floodplain edges and point bars. This zone is subjected to a rapidly aggrading alluvium, harsh stream velocities, and heavy debris accumulation. Common soil textures include coarse loams or sandy loams which have poor moisture holding capacity and high infiltration rates causing rapid drainage after flooding cessation. This zone has the most dynamic land/water interfaces.

Natural levee areas are associated in or near buffer zones. The elevation is often higher than the surrounding floodplain due to high silt aggradation. Soil textures are often fairly coarse loams and are moderately drained to well drained sites. Even though levees are relatively close to the stream, they flood less frequently and soils have high infiltration rates and are often dissected with drainage channels which facilitate rapid removal of flood waters.

The lower elevational floodplains consist of more poorly drained silty loams and silty clay loams best suited for moderately flood tolerant to very tolerant bottomland hardwoods. These floodplains are often inundated for longer periods due to their low elevation and high soil moisture holding capacity.

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The Natural Resource Inventory System (NRIS), which provides basic soil information for soils on project lands between pools 11 and 14, can be found in Section 3.043 of the Army Corps of Engineers Mississippi River Operational Management Plan, Rock Island District, 1989 (http://www.mvr.usace.army.mil/missriver/).

Soil association maps and descriptions for the Refuge are available for review at the Refuge Headquarters.

Climate

The climate of the Mississippi River Basin is subhumid continental with cold dry winters and warm moist summers. Average annual precipitation varies from about 22 inches in the western part of the basin to 34 inches or more in the east. About 75 percent of the total annual precipitation falls between April and September. Basin-wide, the average monthly temperature ranges from about 11 degrees F in January to 74 degrees F in July. Most of the river within the refuge usually freezes solid each winter. Refer to Table 1 for Refuge climate data.

The global warming trend documented nationally and globally in recent years has affected precipitation patterns in the Midwest, resulting in unusual flooding intensity and duration.

As noted above, unusually high floods of long duration have occurred on the Upper Mississippi River over the past decade. Professor James Knox at the University of Wisconsin-Madison has found that "model results and instrument records both support the idea that global warming magnifies hydrologic variability and enhances the hydrologic cycle of the Upper Mississippi River basin (Knox, 2002)." He continues, "analyses of sediment proper-

Table 1: Climate Data, Upper Mississippi River Refuge, River Mile 764 to 503.

Location	Average Maximum Summer Temp (Jun, July, Aug) (degrees Fahrenheit)	Average Minimum Winter Temp (Dec, Jan, Feb) (degrees Fahrenheit)	Average Annual Precipitation (inches)	Average Annual Snow Fall (inches)
La Crosse, Wisconsin (River Mile 700)	83.0	10.9	32.36	44.3
Moline, Illinois (River Mile 485)	84.2	16.3	38.04	35.0

ties [in Wisconsin] indicate that large floods on the Upper Mississippi River have commonly accompanied the beginning of warm and dry climate episodes in the region, but long-term persistence of warming and drought eventually results in smaller floods of high short-term variability.

"Short-term occurrences of large floods were common about 4700, 2500-2200, 1800-1500, 1280, 1000-750, and 550-400 calendar years B.P. [before present], all times that approximate rapid warming and drought in the upper Midwest identified by others. The recent high frequency of large floods on the Upper Mississippi River since the early 1990s may be a modern analogue because these floods have accompanied major hemispheric warming during the same period."

The research by Knox and others indicates that climate is less stable and predictable than people previously thought, and this means that resilience must be a primary consideration in making management decisions. Resilience requires a largely preventive or precautionary approach that leaves an adequate margin for error. The floodplain marshes and forested islands or bluffs of the Upper Mississippi River corridor could have important future roles to play in excess nutrient processing and carbon sequestration, as a means of mitigating effects of climate change.

Contaminants

Refuge and Vicinity on the Upper Mississippi River

Land use practices, floods, other natural events, spills, and other human caused incidents within the watershed affect contaminant levels in river water and sediments. These, in turn affect quality and quantity of fish and wildlife habitat. Dissolved oxygen (DO) is crucial to fish and invertebrate survival and DO levels are good indicators of pollution (Soballe and Wiener, 1999). For example, for decades, untreated sewage entering the river in metropolitan Twin Cities depleted DO level in Pools 2, 3, and 4 had an adverse impact on fish and invertebrates. Between 1978 and 1995, treatment plants were installed and storm water was separated from sewage lines; fish and wildlife has responded favorably. Current measurements by Long Term Resource Monitoring Program show that DO levels on 3 Pools of the Refuge (4, 8, and 13) are generally above 5 parts per million (the level considered marginal for aquatic biota). DO levels below that threshold usually occur in backwaters with low current velocities. This has direct bearing on distribution of backwater fish species.

Agricultural fields, animal feedlots, and urban areas are principle sources for plant nutrients that enter the river (Soballe and Wiener, 1999). Excessive inputs of nitrogen and phosphorus can cause algal blooms, contribute to excessive plant growth and subsequent decomposition that depletes DO (limiting fish ant other aquatic life distribution and survival), and cause public health concerns. This same enrichment may contribute to degraded water quality (hypoxia) in the Gulf of Mexico. Plant decomposition in the sediment can also be a source of ammonia that adversely affects burrowing organisms such as fingernail clams and mayflies.

The Upper Mississippi River transports moderate to high quantities of sediments that enter the river from row crop farming, mining, and urban development. Turbidity levels, a measure of suspended sediments, at the Maquoketa River (Pool 13) in Iowa are more than double all up-river inputs combined. This reflects a substantial increase in inputs from erodible agricultural lands. Sediments fill backwaters and reduce the diversity of water depths, thereby reducing biological diversity of the system. Sediments also reduce light penetration

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necessary for plant growth, as well as absorb and transport containments.

In summary, water quality of the Upper Mississippi River has improved in recent decades in the area of gross sewage pollution, but the river still receives a wide array of agricultural, industrial, and urban contaminants. The risks and threats of certain herbicides, such as atrazine, on the aquatic biota are largely unknown. Excessive nutrients cause excessive plant growth, which upon decomposition, can impact benthic organisms such as fingernail clams.

Polychlorinated biphenyls (PCBs) have been linked to a contaminated Upper Mississippi River food web affecting fish, mink, and burrowing mayflies (Soballe and Wiener, 1999). For additional information see the book *Contaminants in the Upper Mississippi River* (Wiener, et. al., 1984).

Contaminant levels in great blue herons of the Upper Mississippi River have been studied since the mid-1970s (Custer et al, 1997). Levels of PCBs in great blue heron chicks were 29 times greater on the Upper Mississippi River below St. Paul, Minnesota than above St. Paul in the mid 1970s. In 1978 great blue heron eggs had average PCB levels (14.1 μg/g = parts per million) that were possibly sufficient to induce adverse effects on embryos. In 1993, investigators collected great blue heron eggs from 10 colonies on the Upper Mississippi River (8 on the Refuge) to determine the effect of organochlorines, mercury, and selenium on heron nesting (Custer et al, 1997). The authors concluded that these contaminants do not seem to be a serious threat to nesting great blue herons on the Upper Mississippi River. Organochlorine concentrations (including DDE, the metabolite of the insecticide DDT or dichlordiephenyltrichloroethane) were generally low (mean DDE = 1.3 μg/g; PCB = 3.0 μg/g; TCDD [dioxin] = 11.5 μg/g). Eggshell thickness was negatively correlated with DDE concentrations but eggshell averaged only 2.3 percent thinner than eggs collected during the years prior to the use of DDT. Mercury and selenium concentrations (mean = 0.8 and 3.1 μg/g, respectively) in eggs were within background levels.

Mercury, a heavy metal, and PCBs are present in fish of the Mississippi River. Sources of mercury are both natural and man-made; PCBs do not occur naturally. Both contaminants build up through the food chain and the highest levels occur in predatory fish (walleyes, bass, and northern pike), scavengers (catfish) and bottom feeders (carp). Fish consumption advisories are issued by the Health Departments of the four states overlapping the Refuge. Iowa had an active advisory against consumption of fish by children in 1998-1999. This advisory addressed elevated PCB levels in fish along an 11-mile stretch of the Mississippi River in Pool 14 near Davenport, Iowa; it is no longer active.

Minnesota, Wisconsin, and Illinois all have advisories directed primarily toward reducing intake of mercury and PCBs by pregnant women and children under the age of 15. In Illinois, channel catfish, less than 18 inches should be consumed at the rate no greater than one meal per week; catfish over 18 inches, at the rate of one meal per month. Illinois also has carp recommendations, but does not have advisories on walleye, bass, or northern pike taken from the Mississippi River.

Minnesota and Wisconsin have detailed advisories for consumption of fish taken from various pools of the Refuge. However, the extent of consumption and the number of species included on the lists vary between states along the same pool. In order to address PCB concerns in Wisconsin waters of the Mississippi River, buffalo (>15 inches), carp (> 15 inches), catfish (> 20 inches), walleye (>25 inches) , and white bass (all sizes) taken in Pool 4 are limited to one meal per month for pregnant women and for children under 15. In Pools further down river (Pools 5-12) channel catfish, rather than all catfish are on the list, and buffalo, white bass and walleye are removed at various intervals along the Refuge pools. In the case of mercury, Wisconsin advisories indicate that pregnant women and children should consume only one meal of any sport fish per month, state-wide. The Wisconsin advisory brochure defines sport fish as "any fish you catch or are given,

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such as bass, walleye, northern, perch, or crappie. Sport fish are not fish you purchase in a store or restaurant."

Minnesota advisories limit consumption of 10 to 14 species of fish for mercury and/or PCB concerns in Minnesota waters of Pools 4-9. In general, targeted fish less than 20 inches (except pan fish) are limited to one meal per week, larger fish are limited to one meal per month, again for pregnant women and children under 15 years of age. Species included on the Minnesota list include: crappie, flathead catfish, channel catfish, freshwater drum, largemouth bass, smallmouth bass, northern pike, walleye, white bass, white sucker, bluegill sunfish, carp, sauger, smallmouth buffalo, and bigmouth buffalo. Snapping turtles are also on the list for Pool 4.

Lost Mound Unit

The Lost Mound Unit of the Refuge (formerly the Savanna Army Depot) was placed on the National Priorities List for Superfund cleanup in 1989. This addressed the Comprehensive Environmental Response Compensation and Liability Act requirements. Approximately $198 million may be budgeted during the next 20 years for contaminants removal. Presently 69 environmental sites may require cleanup. Some of these contaminants include solvent, petroleum, lead, cadmium, and mercury. TNT contamination has been confirmed to have reached the groundwater and has spread three-fourths of a mile westward toward the Mississippi River. It is reported that 70 percent of the Depot has the potential to contain some unexploded ordnance to include 155 mm and 75 mm howitzers, mortars, grenades, and small arms ammunition.

These environmental contamination, health, and safety issues will be considered in identifying areas for public access to Lost Mound Unit. The 9,715 acres of the Lost Mound unit are to be used for conservation purposes, therefore the degree of clean-up will not be as strict as if housing or industry were proposed for the site. The U.S. Environmental Protection Agency (EPA), the Illinois Environmental Protection Agency (IEPA), Rock Island Ecological Services Office (FWS) and the Department of Army (DA) will ultimately determine when, and if, the contaminated sites are cleaned up to the extent that there are no environmental contamination, health, and safety concerns.

Fish, Wildlife and Habitat

Navigation Pools and Habitat Change

The area of river between two dams is called a "pool," each numbered according to the dam that creates it. Pools are river-like in nature having various flow velocities extending laterally from the navigation channel to the backwaters. Upon impoundment, water levels were permanently raised and stabilized, profoundly changing the character of the river (Green, 1970).

Turn-of-the-century (1890s) and modern (1989) land-cover maps of Pool 8 demonstrate the effect of impoundment on the river in the vicinity of the Refuge (Figure 6). Water levels were increased permanently in the lower half of the pools to create open water areas close to the dam and marshy areas near the middle of the pools. The upstream reaches scoured deeper but were largely unchanged in shape (Theiling, 1999).

Three prominent ecologic zones developed within each pool, particularly in the upper reaches of the Upper Mississippi River System. The lower, impounded zone occurs in roughly the lower half of the pools and generally contains the deepest water of the pool where open water and heavy silts cover former marshes and the lower terrestrial areas. This zone is interspersed with islands that once were high ground and ridges in the pre-lock and dam floodplain. The middle zones of the pools contain extensive backwater marshes and shallow lakes interspersed with tree stump fields where former forests, wet meadows and marshes occurred within the floodplain. These backwaters are, or were at one

Figure 6: Landcover Maps of Pool 8, 1890s and 1989; Upper Mississippi River Refuge[1]

1. *Source : Theiling, 1999*

time, extremely productive. The upper pool zones extend downstream of dams, and retain a system of braided channels and forested islands that occurred prior to installation of the locks and dams. Many of the wet meadows that existed prior to inundation in the upper and middle zones are now forested due to succession and elimination of fire.

The pools are now almost 70 years old and are changing due to sediment accumulation, long-term inundation, and erosional processes that typically occur as shallow reservoirs age. Many of the productive marshes of mid-pool backwaters have lost their vegetative habitats and converted to open water, wind-swept, riverine lakes (Fremling et al., 1976). Sediment continues to fill and degrade aquatic habitats. Other backwaters have attained equilibrium with riverine conditions and maintain aquatic habitat. Erosional action of river currents, wind-driven waves, and boat-generated waves have reduced shorelines and eliminated thousands of islands in the mid-pool to lower impounded areas of the pools (Theiling, 1999) (Figure 7). In many backwaters, heavy wind and wave action has resuspended bottom sediments, resulting in the erosion of shallow areas and the filling of deeper ones. This geomorphic action has eliminated much of the "bathymetric diversity" (e.g., high spots, pockets and channels) that once punctuated the wetland bottoms, making the area so productive for fish and wildlife. In addition, resuspended sediment has increased turbidity levels in the water, thus reducing the amount of sunlight that penetrates the water and is available for aquatic plant growth.

Island loss in the lower one half of UMR pools has occurred since the locks and dams were installed in the mid 1930s, resulting in decreases in habitat for plants and animals. Islands eroded away due to current and wind- and boat-generated waves (Theiling, 1999).

Since the mid 1980s, large-scale projects have been constructed to slow habitat loss in backwaters by combating geomorphic processes of sedimentation and erosion. These projects include installation of low levees to block sediment-laden water from entering the backwaters, dredging channels and pockets to provide bathymetric diversity, constructing islands to reduce wind fetch and direct flows, and protecting (armoring) existing islands from erosion. Experiments have also been done with pool-scale (Pool 8) water level management, drawdowns, to replicate natural low-water conditions and thereby, promote growth of marsh vegetation.

Various river entities recognize there is a critical need to stop the accelerated loss of habitat and general decline of the river. In 1993, the Upper Mississippi River Conservation Committee first sent out a call for action in "Facing the Threat: An Ecosystem Management Strategy for the Upper Mississippi River (UMRCC, 1993)." The same committee repeated the sounds of urgency and warning in its recent publication, "A River that Works and a Working River" (UMRCC 2000):

> "If the UMRS is to continue to survive as a nationally and internationally significant ecological and economic resource we, who are its beneficiaries and stewards, will have to develop, very soon, more efficient and effective restoration and management strategies."

The publication identifies nine tools and measures to restore natural river processes, some of which include improving water quality, providing for seasonal low flow (drawdown) conditions, creating islands, severing pathways for exotic species and providing for fish passage. The actions proposed by this CCP match the Upper Mississippi River Conservation Committee tools for achieving restoration of the ecosystem.

In a more specific follow-up to the Upper Mississippi River Conservation Committee publication, the River Resources Forum, an interagency advisory group to the St. Paul District of the Corps of Engineers, has endorsed Environmental Pool Plans that include practices and plans to achieve desired future environmental conditions of Pools 1-10 (River Resources Forum, 2004). The Rock Island District counterpart to the River Resources Forum is the River Resource Action Team which has also endorsed Environmental Pool Plans for Pools 11-22. This CCP will promote the same strategies described in the Environmental Pool Plans documents to meet Refuge goals and objectives. Refer to Appendix N of the Final EIS/CCP for examples of Environmental Pool Plan maps.

The Izaak Walton League of America recognizes an uncertain future for the Refuge in terms of development pressures, impacts of navigation, and ever-increasing recreational use (Izaak Walton League, 1999).

In addressing concerns about the future health and sustainability of the Upper Mississippi River Basin, The Nature Conservancy has identified areas of greatest freshwater biodiversity in the basin. Its purpose is to "galvanize conservation and restora-

Figure 7: Island Loss in the Lower Half of the Upper Mississippi River Pools, Upper Mississippi River Refuge[1]

1. *Source: Theiling 1999*

Table 2: Special Designated Areas Within the Upper Mississippi River Refuge

Name of Area	Category[1]	State	Acres	Habitat Type	Pool	River Mile(s)
Winona District						
Nelson-Trevino Bottoms	RNA SNA NNA	Wisconsin	3,740	Silver Maple; American Elm	4	760-763
La Crosse District						
Midway Railroad Prairie	SNA	Wisconsin	5	Bluestem Grassland	7	706
McGregor District						
Reno Bottoms	RNA	Minnesota	1,980	Silver Maple; American Elm	9	679-681
Twelve-Mile Island	RNA	Iowa	900	Silver Maple; American Elm	11	610-614
Savanna District						
Thomson-Fulton Sand Prairie	RNA	Illinois	321	Bluestem Grassland	13	525-527
Total Acreage			6,946			

1. *RNA = Research Natural Area; SNA = Scientific and Natural Area; NNA = National Natural Area.*

tion action by all stakeholders at the critical places within the UMRB" (Weitzell, et al., 2003).

Special Management Areas

Wilderness

No lands within the existing Refuge boundary are suitable for designation as wilderness, which is defined in the Wilderness Act of 1964 and subsequent amendments. Roadless areas within the larger bottomlands associated with major river deltas are too small and too frequently accessed or impacted by human activities to meet Wilderness designation criteria. However, some of these areas do satisfy the criteria for other categories of special management designation, such as Research Natural Areas, which recognize wild qualities and fragility of habitats by restricting the nature or intensity of activities that disturb wildlife or damage habitat.

Special Designated Areas

Within the refuge, there are currently four designated Research Natural Areas (RNA), one National Natural Landmark (NNA) that partially overlaps a Research Natural Area, and one state-designated Scientific and Natural Area (SNA) (Table 2). These areas total 6,946 acres.

These areas assist in the preservation of examples of significant natural ecosystems for comparison with those that are more influenced by human activities. They provide educational and research areas where ecological observations and studies can be conducted with minimal disturbance, and natural processes can evolve without significant human intervention. Under certain circumstances, some manipulation of the environment through active management may be allowed to maintain special features. Hunting, fishing, bird watching, photography, wildlife observation, nature interpretation and environmental education may be allowed with adequate justification.

Conservation Easements

When the Farm Services Agency (FSA), formerly known as the Farmers Home Administration (FMHA), acquires property through default on loans, it is required to protect wetland and floodplain resources on the property prior to public resale. The U.S. Fish and Wildlife Service assists the Farm Services Agency in identifying important floodplain and wetland resources for protection with perpetual conservation easements. Management responsibility for the easement may be transferred to a state or federal agency for administration. The Refuge has held a number of such easements since the late 1980s, and may, in the future, hold more of these or other types of conservation easements

Table 3: Conservation Easements Maintained by Upper Mississippi River Refuge

Name	Habitat	Acres	Year	State	County
Winona District					
Haney	Riparian	38	1989	Minnesota	Mower
Jeche	Wetland	1	1989	Minnesota	Fillmore
McCabe	Riparian	36	1989	Minnesota	Fillmore
Gardemann	Riparian	35	1990	Minnesota	Fillmore
Heggedahl	Riparian	8	1990	Minnesota	Dodge
Rediske	Riparian	6	1990	Minnesota	Fillmore
Yenter	Riparian	51	1990	Minnesota	Fillmore
La Crosse District					
Engh	Riparian	30	1988	Wisconsin	Vernon
Nerison	Riparian	18	1988	Wisconsin	Vernon
Barton	Riparian	16	1989	Wisconsin	La Crosse
Straight	Wetland	5	1995	Wisconsin	Richland
Schminick	Wetland	25	1999	Wisconsin	Sauk
McGregor District					
Riley	Wetland	10	1989	Wisconsin	Grant
Rosonke	Wetland	157	1989	Iowa	Chickasaw
Engle	Wetland	87	1990	Iowa	Floyd
Quade	Wetland	47	1990	Iowa	Bremer
Beine	Wetland	20	1991	Iowa	Bremer
Gott	Wetland	18	1995	Iowa	Bremer
Rossol	Wetland	24	1995	Iowa	Bremer
Kleve	Wetland	29	2000	Iowa	Clayton
Hartwig	Wetland	20	2001	Iowa	LaFayette
Savanna District					
Reese	Grassland	42	1990	Iowa	Blackhawk
Atkinson	Timber	107	1990	Iowa	Delaware
Krogman	Timber	66	1991	Iowa	Delaware
Dickel	Timber	108	1990	Iowa	Iowa
Telandis	Wetland	235	1992	Iowa	Scott

which are becoming popular tools for maintenance of water quality and wildlife diversity through habitat protection.

The authority for the Farm Services Agency easements comes from the Consolidated Farm and Rural Development Act (7 U.S.C. 1981 and 1985, as amended); Executive Order 11990 providing for the protection of wetlands; and Executive Order 11988 providing for the management of floodplain resources. The U.S. Fish and Wildlife Service administers the easements through the National Wildlife Refuge System. This Refuge maintains a total of 30 conservation easements totaling approximately 1,178 acres, located in 16 counties of three states, Minnesota, Wisconsin, and Iowa (Table 3). Widely dispersed easements have proven difficult to adequately manage with limited refuge private lands staff. Easements need regular inspection and management to prevent encroachment and resource degradation.

Notable State Management Areas

The states manage some important and often magnificent wildlife management areas, parks, and

Table 4: Notable State Management Areas

Location	Area (acres)
Minnesota	
Pool 4 Wildlife Management Area	146
McCarthy Lake Wildlife Management Area	2,873
Kellogg-Weaver Dunes Scientific and Natural Area	1,004
John A. Latsch State Park	1,654
Thorpe Wildlife Management Area	139
Great River Bluffs State Park	3,067
Total for Minnesota	8,883
Wisconsin	
Tiffany Bottoms Wildlife Area	12,740
Whitman Dam Wildlife Area	2,173
Merrick State Park	320
Perrot State Park	1,270
Van Loon Wildlife Area	3,981
Rush Creek State Natural Area	2,265
Wyalusing State Park	2,628
Wyalusing Unit Lower Wisconsin State Riverway	690
Total For Wisconsin	26,067
Great River State Trail	24 miles
Iowa	
Pool Slough Wildlife Management Area	555
Fish Farm Mounds Wildlife Management Area	576
Village Creek Area	52
Yellow River State Forest	8,503
Pike's Peak State Park	970
Mines of Spain State Recreation Area	1,387
Bellevue State Park	770
Green Island Wildlife Management Area	3,722
Princeton Wildlife Management Area	1,208
Total for Iowa	17,743
Illinois	
Palisades State Park	2,500
Total for Illinois	2,500

forests adjacent to the Refuge, both in and outside the floodplain. Coordination of similar land management needs and programs is regular and ongoing since fish and wildlife, and at times the public, do not distinguish between administrative boundaries. Table 4 shows the notable state resource lands next to the Refuge.

Threatened and Endangered Species

This section and the following section address two federally listed threatened and endangered species and three candidate threatened and endangered species that occur on or very near the Refuge. State listed threatened and endangered species are not described in this section but will be addressed in

Figure 8: Annual Bald Eagle Production on Upper Mississippi River Refuge, 1986-2005

appropriate step-down plans. The state listed species that occur on Refuge include: six mammals, 40 birds, 18 fish, seven reptiles, three amphibians, and 20 mussels (Appendix K of the Final EIS/CCP).

Bald Eagle

The Bald Eagle *(Haliaeetus leucocephalus)* was declared an endangered species in 1973 due to low populations that existed following a century of persecution and habitat loss and several decades of poisoning from hard core pesticides (DDT, dieldrin, endrin, etc.). The species began to recover after these pesticides were banned in 1972 and public awareness and management provided protection for the bird. It continues to recover and its full recovery is possible. The success story of Bald Eagle recovery is reflected in the number of active nests found on the Refuge since 1972 when one nest was present. In 1986, nine nests produced nine young, and by 1996, 62 active territories produced an estimated 91 fledged young (Figure 8). In 2005, 167 active territories produced and estimated 279 young, 98 more eaglets than in 2004. This was the largest annual increase in production recorded on the Refuge. Total production estimates were based upon the average number of young (1.67 young per nest) on 106 nests with known outcomes. Bald Eagle nesting territories occur over the length of the Refuge and are most numerous within the McGregor District which has over 90 active nests. Annual Bald Eagle production on the Refuge has shown a 31-fold increase in the 19 years between 1986 and 2005.

Higgins Eye Pearlymussel

The Higgins eye pearlymussel *(Lampsilis higginsii)* was listed as endangered in 1976 due to declines in abundance and distribution. Causes include commercial harvest, creation of impoundments in the 9-foot navigation system, channel maintenance dredging and disposal activities, changes in water quality from municipal, industrial, and agricultural activities, unavailability of appropriate fish hosts for mussel larval stages, disease (USFWS, 1983), and exotic species (especially zebra mussels).

The biological assessment of the navigation system (USACE, 2004a) indicates that *L. higginsii* occurs most frequently in medium to large rivers with current velocities of 0.49 to 1.51 feet per second and in depths of 2 to 19.7 feet. It appears to prefer water with dissolved oxygen greater than 5 parts per million and calcium carbonate levels greater than 50 parts per million. The species is significantly correlated with a firm, coarse sand substrate.

L. higginsii is usually found in large, stable mussel beds with relatively high species and age diversity.

Nearly all remaining habitat on the Upper Mississippi River for *L. higginsii* is within the 9-foot navigation project. Higgins eye pearlymussel recovery teams have identified Essential Habitat Areas that are believed to contain viable reproducing *L. higginsii* populations. These teams indicate that recovery of the species could not be accomplished without maintaining the Essential Habitat Area populations. Five of the 10 identified Essential Habitat Areas are within or near the Refuge (USACE, 2004a) as follows:

Wisconsin River (River Mile 0 - 0.2)
Upper Mississippi River at Whiskey Rock, Ferryville, Wisconsin, Pool 9 (River Mile 655.8 - 658.4)
Upper Mississippi River at Harpers Slough, Pool 10 (River Mile 639.0 - 641.4); Upper Mississippi River Main and East Channels at Prairie du Chien, Wisconsin, and Marquette, Iowa, Pool 10 (River Mile 633.4 - 637)
Upper Mississippi River at McMillan Island, Pool 10 (River Mile 616.4 - 619.1)
the Upper Mississippi River at Cordova, Illinois, Pool 14 (River Mile 503.0 - 505.5)

Recent Refuge activities involving Higgins eye pearlymussel include limited participation in recruitment projects, monitoring zebra mussels, reviewing permits for river projects, designing habitat projects, and environmental education.

Candidate Threatened and Endangered Species

Eastern Massasauga Rattlesnake

The Eastern massasauga rattlesnake *(Sistrurus catenatus catenatus)* has declined throughout its range, an area that extends from New York and southern Ontario westward to Iowa and Missouri. The decline is from 33 percent in Michigan to 100 percent in Minnesota. The primary causes are habitat loss and persecution. Past anti-rattlesnake campaigns have reduced some populations beyond a recoverable threshold. Habitat (wet sedge meadow, emergent wetland, shrub-carr) has been lost to natural succession, conversion, changes in hydrology (prolonged saturation of soil), and fragmentation (USFWS, 2003).

Eastern massasaugas occur at only one known site (Nelson-Trevino Research Natural Area, Pool 4)

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within the Refuge, although potential habitat exists elsewhere within the system. The snake occurs within the Black River Bottoms (Pool 7) on private land, adjacent to the Refuge and within the approved acquisition boundary of the Refuge. Small populations of massasaugas are scattered along the length of the lower Wapsipincon River in Scott and Clinton Counties, Iowa (VanDeWalle and Christiansen, 2002). The most recent records of live specimens found in that area were near Long Grove and Calamus, 13 and 30 miles west of the Upper Mississippi River floodplain. Searches in 2001 and 2002 found no live specimens in these counties.

The Refuge is participating in developing and implementing Candidate Conservation Agreements for massasaugas at Nelson-Trevino, the Black River Bottoms, and adjacent private and state land in Wisconsin.

Sheepnose

This summary is from the sheepnose *(Plethobasus cyphyus)* status report (USFWS, 2002a). The sheepnose has been eliminated from two-thirds of the total number of streams from which it was historically known (26 streams versus 77, historically). It was uncommon in what are now Mississippi River Pools 13-23.

In the upper Mississippi River, the sheepnose is an example of a rare species becoming rarer. Despite the discovery of juvenile recruitment in Pool 7, the sheepnose population levels appear to be very small and of questionable long-term viability given the threats outlined below. Along with other mussels of the Upper Mississippi River, the sheepnose is seriously threatened by zebra mussels. Other threats include channel maintenance dredging and sedimentation from tributary systems. Sedi-

ment accumulations above lock and dams generally preclude the occurrence of sheepnose.

The majority of the remaining populations of the sheepnose are generally small and geographically isolated, which makes them much more susceptible to extirpation from single catastrophic events such as toxic chemical spills. Furthermore, this level of isolation makes natural repopulation impossible without human intervention. Isolation prohibits the natural interchange of genetic material between populations, which can lead to inbreeding depression.

Conservation activities that would benefit the species include funding programs, research and surveys, outreach, and habitat improvements and conservation.

Spectaclecase

The spectaclecase *(Cumberlandia monodonta)* was declared a candidate species May 4, 2004 (USFWS, 2002b). As reported in the Federal Register, the spectaclecase is apparently more of a habitat specialist than are most mussel species. Primarily a large-river species, it can occur on outside river bends below bluff lines. It often inhabits riverine microhabitats sheltered from the main force of current. It occurs in substrates from mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with slow to swift current.

The spectaclecase occurred historically in at least 45 streams in the Mississippi, Ohio, and Missouri Basins. Extant populations of the spectaclecase are known from 20 streams. Seven of those populations are represented by a single specimen each. Only three or four populations could be characterized as large or stable. Threats to the continued existence of the spectaclecase appear to include exotic species, especially zebra mussels; delivery and deposition of fine sediments; small population sizes; isolation of populations; livestock grazing; wastewater effluents; mine runoff; unstable and coldwater flows downstream of dams; gravel mining; and channel dredging. Although there are ongoing attempts to alleviate some of these threats at some locations, there appear to be no populations without significant threats and many threats are without obvious or readily available solutions. In addition, the fish host of the spectaclecase is unknown; thus, propagation to reestablish the species in restored habitats and to maintain nonreproducing populations and focused conservation of its fish host are not yet possible. Therefore, the threats to spectaclecase are considered to be of high magnitude. However, 10 populations are reproducing or supported via immigration from large populations, and three or four of these populations may be described as large.

The spectaclecase disappeared from the Prairie du Chien, Wisconsin area in the 1920s. A 1981 survey failed to locate living spectaclecase in the Wisconsin portion of the upper Mississippi River (between Pool 3-11) using brail and SCUBA, but reported dead shells in Pool 11. The only live specimens found recently on the Upper Mississippi River were in Pool 15 and further down river; none on the Refuge portion of the Upper Mississippi River, Pools 4-14.

Wildlife Resource Conservation Priorities

The U.S. Fish and Wildlife Service's Region 3 list of Resource Conservation Priorities contains 243 species of fish and wildlife, of which, 65 birds, three mammals, six fish, two reptiles, 26 invertebrates, and 13 plants occur on the Refuge (Appendix K of the Final CCP/EIS). These species are considered to be in the greatest need of attention under the Service's full span of authorities. The Resource Conservation Priorities identifies strategies that will contribute to the conservation, protection, and recovery of migratory birds, threatened and endangered species, and interjurisdictional fish, as well as the habitats on which they depend, thus assisting in fulfilling Service missions.

The fact that a species is not included on the Resource Conservation Priorities list does not mean it is unimportant; it means only that when faced with the choice of addressing the needs of several species, the Service should place emphasis on those identified as priority from a Regional perspective. Many species not listed will receive incidental benefits from Refuge management. The Resource Conservation Priorities list will assist in prioritizing workloads, focusing conservation actions, identifying research priorities and training needs, preparing of Refuge plans, and developing budgets.

Migratory Birds

The U.S. Fish and Wildlife Service is responsible for the conservation and management of more than 800 species of migratory birds that occur in the country. In 2004, the Service released the Migratory Bird Program's ten-year strategic plan, "A Blueprint for the Future of Migratory Birds" (USFWS,

2004). It calls for cooperation from all governments and partners to ensure the continued survival of migratory birds. The Blueprint identifies three priorities for the Service's Migratory Bird Program: 1) address the loss and degradation of migratory bird habitat, 2) improve scientific information on bird populations, and 3) increase partnerships to achieve bird conservation. Implementation of Refuge plans will compliment these priorities by addressing needs of some Birds of Management Concern listed in an appendix to the Blueprint.

Waterfowl

National Wildlife Refuges play a crucial role in providing breeding, migrational, and wintering ground habitat for waterfowl. Over the past 75 years, the U.S. Fish and Wildlife Service has strategically established many of its refuges to help meet widely held waterfowl conservation goals. Features common to refuges is the inclusion of closed areas, which provide waterfowl the opportunity to feed and rest without disturbance during migration and at wintering locations. Without disturbance, waterfowl are provided opportunity for molting, preening, pair bonding and fat storage, all of which help build healthier populations. Closed areas also help keep regional populations in and around refuges, providing hunting opportunity on adjacent public and private lands. The value of closed areas to waterfowl would decline if they were frequently moved around or rotated.

Refuge Waterfowl

The Refuge lies within the Mississippi Flyway, through which an estimated 40 percent of the continent's waterfowl migrate. It is a critical migration corridor (Reid et al. 1989) for 10 species including Tundra Swans, Ring-necked Duck and Hooded Merganser. The other seven species are also on the U.S. Fish & Wildlife Service's Region 3 Resource Conservation Priority List and include: Lesser Snow Geese, Canada Geese, Wood Duck, Mallard, Blue-winged Teal, Canvasback, and Lesser Scaup. The corridor is also important for an additional eight species of waterfowl.

Waterfowl populations on the Refuge can fluctuate widely from year to year due to variations in flyway populations, water, and food conditions off-river, food availability in the backwaters, and weather (Korschgen et al. 1999). These factors, combined with survey variability over the years, are considered when analyzing waterfowl use data collected on the Refuge.

Biologists have conducted various types of ground counts and aerial waterfowl surveys of the Refuge since the 1920s. These surveys are not all-inclusive counts, but rather indices to the number of birds present on the Refuge. Changes in methods, observers, survey routes, and aircraft types preclude direct comparisons of one year or group of years to another. However, general trends and descriptions of changes in distribution of the birds can be made using the data. These variables need to be considered when interpreting data presented below.

The following discussion addresses four main groups of waterfowl: diving ducks, puddle ducks (also called dabbling ducks), geese, and swans. Common diving duck species on the Refuge are the Canvasback, Lesser Scaup, Common Goldeneye, Ring-necked Duck, Bufflehead, Ruddy Duck, and mergansers (Hooded, Common and Red-breasted). Diving ducks are recognized by their generally white, black, and gray colors. Their wings are relatively small compared to their body size, so divers must use rapid wing beats when they fly, and when launching into flight, most of this group patter along the water before becoming airborne. Divers have large feet, placed well back on the body and are not agile on land. They frequent large deep marshes, lakes, rivers, and coastal bays. They dive, sometimes to great depths, to feed on aquatic plants, fish, clams, and snails. Favorite diver foods on the Upper Mississippi River are wild celery, sago pondweed, fingernail clams, and snails.

The most common puddle duck species on the Refuge are the Wood Duck, Mallard, Blue-winged Teal, Wigeon, Gadwall, Pintail, and Green-winged Teal. Puddle ducks often have brightly colored wing patches (speculum) and males are colorful throughout, while females are generally a camouflage

U.S. Fish & Wildlife Service

Figure 9: Peak Number of Mallards and Canvasback Ducks on Upper Mississippi River Refuge, Selected Years 1956 to 2005[1]

1. *Canvasback numbers for the years 1962-1975 are for Pools 7 and 8 only. Years 1978 and 1984 are for Pools 7, 8 and 9 only.*

brown. Puddle ducks are sure-footed, often seen feeding or roosting on land. They typically utilize freshwater, shallow marshes, rivers, and ponds where they feed by dabbling on the water surface or tipping, rather than diving. Puddlers feed on aquatic insects and plants, acorns, or grain. On the Upper Mississippi River, they frequent backwater marshes containing arrowhead, river bulrush, cattail, and other emergent and submergent vegetation. These plant communities are steadily declining on the Refuge.

In the early years of the Refuge (1924-1935), when no locks and dams were present, lesser and greater scaup were the most common migrants (Green 1970). They utilized riverine conditions of the main and secondary channels. In the pre-lock and dam era, most of the many sloughs and wetland pockets were dried out by the fall season and not suitable for migrating waterfowl. During spring, when the bottoms were flooded, there was a greater waterfowl use and diversity.

Installation of the locks and dams brought about instant change with stabilized water levels creating productive shallow marshes and aquatic areas. Increase in waterfowl use was "phenomenal", with both diving ducks and puddle ducks migrating and staging on the Refuge. After flooding and until the 1960s, puddle ducks (such as Mallards) were more abundant than divers (such as Canvasbacks) in the fall (Figure 9). In 1956, the peak count of Mallards reached 190,000 birds while Canvasbacks reached only 10,000. By 1978, those numbers were almost reversed, with 195,000 Canvasbacks counted on Pools 7 and 8 only and 12,000 Mallards counted, Refuge-wide.

Puddle ducks declined in response to losses of secure emergent habitat due to sedimentation, wind and wave action, and continuous flooding regimes. Divers responded to habitat changes on the river toward more open water conditions that support underwater plants. At the same time, crucial diving duck habitat was lost in adjacent states due to habitat degradation and drainage.

During the 1980s, numbers of Canvasbacks declined to about 80,000 birds and mallard numbers increased to about 40,000. These declines reflected reductions in continental populations and losses in Refuge habitat. Since 1997, canvasback peak numbers on the Refuge have exceeded 250,000 birds each year, with a peak of 431,000 observed October 25, 1999. The Refuge generally supports 60 to 75 percent (82 percent in 2005) of the Canvasbacks counted in the eastern U.S during annual Coordinated Canvasback surveys (Figure 10).

Figure 10: Percent of the Eastern Population of Canvasbacks that Occurred on Upper Mississippi River Refuge During the Coordinated Canvasback Survey, 1974-2005

Figure 11: Peak Number of Canada Geese and Tundra Swans on Upper Mississippi River Refuge, Selected Years 1956-2005

Canada Goose and Tundra Swan numbers were much lower between 1924 to 1965 than they are today (Figure 11). Canada Goose peaks ranged from less than 1000 to about 7,500 during that period. Recent peaks range from 10,000 to 30,000 geese. The increase reflects higher populations of geese in the flyway and the availability of habitat on the river.

Tundra Swans did not begin to use the Mississippi River as a significant migration stop-over until the mid-1980s when peak numbers reached nearly 15,000 swans in 1984. Only about 100 were counted in the 1950s. Peak counts have exceeded 30,000 birds in recent years and it is estimated that 20 percent of the Eastern continental population migrates through the Refuge each fall. The Refuge is an important rest stop for family groups of swans during migration. Aerial surveys and video surveys in 1998-99 revealed that "at one point in late November, Pools 4-9 could have been used by 51.7 percent of all cygnets in the eastern population" of Tundra Swans (Thorson, 2002).

Figure 12: Average Dabbling Duck Use-days by Pool, 1997-2004, Upper Mississppi River Refuge

Figure 13: Average Diving Duck Use-days by Pool, 1997-2004, Upper Mississippi River Refuge

The Refuge supports breeding waterfowl populations of Mallards, Wood Ducks, Hooded Mergansers and Canada Geese. Mallard duckling production on islands in Pools 7 and 8 has been monitored most years since 1981 by Wisconsin Department of Natural Resources (Nelson and Andersen, 2003). Success rates range from 11 percent to 89 percent (average is 66 percent in Pool 7 and 52 percent in Pool 8). Nest success reflects the extent of predator-free conditions on islands. Annual production (duckling hatched) averages 785 on Pool 7 and 229 on Pool 8 islands. State biologists and managers are interested in promoting local mallard production on natural and man-made islands of the Refuge. Grassland nesting cover is difficult to maintain in floodplain habitat where natural processes are promoted.

Waterfowl Management Challenges

Waterfowl management challenges on the Refuge center around the need to provide secure resting and feeding habitat for birds in migration, as well as distribute hunting opportunities throughout the Refuge. Optimal bird distribution is achieved by

Figure 14: Average Tundra Swan and Canada Goose Use-days by Pool, 1997-2002, Upper Mississippi River Refuge

providing adequate food resources (carrying capacity) where birds will not be disturbed. Managers consider various factors that influence waterfowl distribution on the Refuge including the affects of hunting and other forms of human disturbance on waterfowl, the amount of available food, the longitudinal distribution of food resources on the river, the distances ducks are known to fly from roosting to feeding sites, and other biological needs.

Current observations and survey data clearly show that ducks, swans and geese are not evenly distributed on the Refuge during fall migration (Figure 12, Figure 13, and Figure 14). This is validated with weekly aerial waterfowl survey data that are converted to use-day numbers. Such data help describe the carrying capacity of an area, i.e., how many birds can be supported with food and resting sites for how long. Use-days are the product of the average the number of birds counted between two counts multiplied by the number of days between those counts. For example, first count has 1,000 birds, second count eight days later has 2,000 birds (1500 x 8 = 12,000 use-days). Between 1997 and 2004, most of the annual use-days occurred in four of 12 Pools on the Refuge (Pools 7, 8, 9, and 13). These pools total 91,143 acres, or 38 percent of the entire Refuge, but have over 80 percent of the total waterfowl use-days over the past 8 years. On average, 86 percent of the puddle duck use-days were in these four pools, as were 98 percent of the diving duck, 81 percent of the Canada Goose, and 87 percent of the Tundra Swan use-days .

This uneven distribution is attributed to the presence or absence of abundant food resources that occur in areas with reduced levels of human disturbance (closed areas). Optimal conditions occur best in Pools 7, 8, 9, and 13 and are nearly absent in other Pools. Management intends to achieve a more even distribution by enhancing habitat conditions and minimizing human disturbance factors for all waterfowl groups throughout the Refuge.

If habitat quality and levels of protection were similar in all Refuge pools, waterfowl distribution would continue to be somewhat uneven along the Refuge because of inherent differences in size, geomorphology, and hydrology among the pools. However, a more optimal distribution is possible if carrying capacity and habitat security are improved in pools up and downstream of Pools 7, 8, and 9.

It is widely understood that human disturbance of waterfowl on the breeding grounds can be detrimental to production of young birds. Human disturbance of migrating waterfowl can “have dramatic effects on the bird’s energy balance” (Korschgen et al., 1985) and influence survival and production of young in subsequent years. The better the quality of habitat, with no disturbance, the quicker birds replenish fat reserves during migration.

Four major categories of human disturbance have varying impacts on waterfowl (Korschgen and Dahlgren, 1992). These factors, listed in order of decreasing disturbance, include “rapid over water movement with loud noise (power boats, airboats, low-flying airplanes, and helicopters), over water movement with little noise (sail boats, canoes, kay-

aks), little overwater movement or noise (wading or swimming), and shoreline activities (bank fishing, birdwatching, hiking, car traffic)." Raptors and mammals (Bald Eagles, raccoon) can also disturb waterfowl.

The "closed area" system on the Refuge attempts to provide reduced disturbance to waterfowl within an established area via the following closed area regulations:

> "closed to all migratory bird hunting; other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons."

Complete sanctuary conditions do not occur in Refuge closed areas with one exception, Spring Lake on Pool 13, because public entry is allowed for other purposes, including recreational boating, angling and commercial fishing.

Upon establishment of the Refuge in 1924, the entire Refuge was closed to entry. Soon, in the 1930s, the Refuge was open to hunting except for 20 closed areas, totaling 34,150 acres (see Appendix Q of the Final EIS/CCP). Closed areas were on U.S. Fish and Wildlife Service fee-title lands only and did not have easily recognizable boundaries, nor did they protect the best habitats for migrating waterfowl. Actually, these early closed areas were put in place for reasons of management convenience more so than meeting needs of migrating waterfowl. Eventually, modifications were made in 1957-58 to include 14 units, covering 41,600 acres. At the time of establishment, these closed areas were all quite functional in harboring birds because they had adequate habitat and successfully reduced impacts of hunting and other disturbance factors. These closed areas continue to provide core elements of the existing system of 15 areas (14 closed areas and one sanctuary) that total 44,544 acres.

Over the years, boundary adjustments have been made which have reduced the size of many closed areas. An exception is the Trempealeau National Wildlife Refuge which has increased from about 700 acres in 1957 to nearly 6,226 acres today. One new closed area, the Pool Slough Closed Area, became operational on Pool 9 in 2003. About 1,100 acres of this 1,350-acre closed area are located on the Refuge. The Iowa Department of Natural Resources owns the remaining acres and has designated the site a waterfowl refuge and closed to all trespass from September 15 through December 25, then open to hunting and trapping.

In the 45 year interval since 1957, changes have occurred within the closed area system so that not all closed areas are functioning as intended. Changes include habitat loss and associated amount of available food, waterfowl population changes, dominant species present, and extent and type of public use. This imbalance in closed area ecology has contributed to the uneven distribution of waterfowl on the Refuge as noted in the discussion above. For example, Canvasback use has greatly increased in some closed areas and "open" areas of Pools 7, 8 and 9, but declined precipitously in others due to habitat losses and possible disturbance factors. The extensive loss of shallow- and deep-water marshes of the Refuge, both within and outside closed areas has resulted in declines in puddle duck use of the Refuge.

A key factor influencing waterfowl distribution and use of closed areas is carrying capacity, or the amount of available food for waterfowl, such as plant seeds and tubers and fingernail clams and mayflies. This carrying capacity component "is probably the most important variable for evaluating criteria for managing waterfowl closed areas" (Kenow, et al. 2003). The availability of plant food resources has been assessed for various aquatic, marsh, and wet meadow plant communities in Pools 7 and 8 (Kenow, et al. 2003). Kenow acquired seeds and tubers from 9 selected vegetation types within Pools 7 and 8 to generate production estimates for each type. These estimates were then extrapolated to the larger Upper Mississippi River landscape using a GIS application model. Plant food production is expressed in terms of gross energy value to waterfowl. The investigators note that plant food productivity estimates are inherently variable. Consequently, production variance estimates are large and need be considered when using extrapolated production estimates.

Tuber production, primarily from arrowheads and wild celery, provided the most significant contribution to overall gross plant food energy available to waterfowl. Arrowheads are found primarily in deep marsh perennial vegetation types, while wild celery occurs in submerged vegetation types.

Slivinski (2004) conducted a GIS analysis (based on year 2000 photography) of the potential waterfowl carrying capacity for the entire Refuge, and for existing and proposed closed areas within the Refuge. The entire report and appendices are posted at

Table 5: Estimated Waterfowl Food Plant Energy Production in Closed Areas on Pools 4-14 Under Four Alternatives, Upper Mississippi River Refuge[1]

Selected Land Cover Types	Refuge		Alternative A Closed Areas		Alternative B Closed Areas			Alternative C Closed Areas			Alternative D Closed Areas		
	Total Area (Acres)	Plant Food Energy (million Kcal)	Total Area (Acres)	Plant Food Energy (million Kcal)	Total Area (Acres)	Plant Food Energy (million Kcal)	Percent Change from Alt. A	Total Area (Acres)	Plant Food Energy (million Kcal)	Percent Change From Alt. A	Total Area (Acres)	Plant Food Energy (million Kcal)	Percent Change From Alt. A
Deep Marsh Annual	482	300	280	174	280	170	0%	280	174	0%	240	150	-14%
Deep Marsh Perennial	5,496	39,606	852	6,142	1,431	10,313	68 %	863	6,222	1%	1,119	8,064	31%
Open Water	95,734	1,110	18,771	218	22,819	265	22%	18,823	218	0%	18,777	218	0%
Rooted Floating Aquatic	19,091	4,051	3,957	840	5,743	1,219	45%	3,984	845	1%	4,428	940	12%
Shallow Marsh Perennial	11,354	5,112	1,202	541	2,579	1,161	115%	1,192	537	-1%	1,534	691	28%
Sub-merged Vegeta-tion	20,978	14,801	7,659	5,404	9,009	6,356	18%	7,649	5,396	0%	7,937	5,600	4%
Wet Meadow	10,586	1,237	1,281	150	1,770	207	38%	1,292	151	1%	1,280	150	0%
Other Cover	70,112	0	9.968	0	16,846	0		10,008	0		8,506	0	
Total	234,327	66,127	43,970	13,625	60,476	19,694	45%	44,091	13,701	1%	43,821	15,811	16%

1. *Acreage values were made at the time of the Slivinski study (2004); values shown in Table 3, Appendix C, are current and correct.*

http://midwest.fws.gov/planning/uppermiss/index.html. Refuge-wide, total gross energy available in eight vegetative types was calculated to be 66.2 billion kilocalories. If all that energy were present in just wild rice, it would equal 33.2 million pounds of wild rice; if it were all arrowhead tubers it would equal 45.6 million pounds of tubers. The actual usable (metabolizable) energy for seed and tuber resources are about one half to three fourths of the gross energy values, depending on the plant species. Variations in plant species, growing conditions, availability, human disturbance, and weather are important factors in determining the number of birds that might utilize this energy source on the Refuge.

A disproportionately high amount (63 percent) of this total energy source occurs in Pools 7, 8 and 9 and is an important factor in accounting for the uneven distribution of waterfowl using the Refuge during the fall migration (refer to discussion above). This GIS investigation shows that the presence (or addition) of deep marsh perennial and submerged vegetation types, along with the shallow marsh perennial type, is crucial to the improvement of the carrying capacity for waterfowl in the Refuge's closed area system.

Existing closed areas now encompass approximately 20 percent of the total energy present in eight vegetation types studied (Table 5). This analysis did not include forest cover types, to which future investigations should be directed.

Table 5 also shows estimates of waterfowl food plant production (gross energy) in closed areas on Pools 4-14 of the Upper Mississippi River under four alternative closed area configurations. Since Alternative E and the subsequent Final CCP were developed after Slivinski's report, it is not included in the table. However, Final CCP values are similar to Alternative D since the core areas changed little in the Final CCP.

Waterfowl managers and biologists have identified the need for refuges to be placed along migration corridors at intervals that provide secure habitat in the form of "stepping stones" or "a string of pearls." One factor used in selecting refuge or closed area locations along the corridor is the flight distance various waterfowl species will take in order to roost and/or find food free from disturbance. In

general, puddle ducks fly shorter distances (Wood Ducks 1 mile; Black Ducks 4 miles; Mallards 4-25 miles; and Pintails 12-30 miles), while Canvasbacks, a diver, will fly up to 24 miles. We have a double management challenge in this regard because some of the existing Refuge closed areas are 37 to 46 miles apart, while others are 4-16 miles distant, but have minimal waterfowl use because food resources are inadequate and/or human disturbance factors are present.

In 1978, and again in the early 1980s, river biologists and managers made three assessments of the existing closed area system in regards to its functionality in holding birds for feeding and resting, as well as providing hunting opportunities. The Wildlife Technical Committee of the Upper Mississippi River Conservation Committee proposed changes in reports completed in 1978 and 1985. The committee recommended changes to closed areas in Pools 4, 5A, 8, 9, 10, 13, and 14, but none were implemented.

Further considerations were made to modify closed areas during early stages of preparing the Refuge's 1987 Master Plan (USFWS, 1987). At that point, two new options were drafted to increase the number of acres of closed areas, but no closed area changes were included in the final Master Plan. Instead, the Plan recommended to delay any changes, pending completion of closed area studies about impacts of recreation on waterfowl concentrations and the effectiveness of voluntary waterfowl avoidance areas.

A voluntary waterfowl avoidance area (VWAA) was established, in cooperation with state and local governments and conservation organizations, on Lake Onalaska in Pool 7 in 1986 to reduce boating disturbance to waterfowl within the existing closed area. Studies on boater compliance were conducted in 1993 and 1997 (Kenow et al., 2003a). Despite a 60 percent increase in boating traffic from 1986 to 1997, lake-wide disturbance rates were comparable to 1981 levels. Investigators reported that about one third of the observed intrusions in the VWAA were by anglers and commercial fisherman. The avoidance areas contributed to the value of Lake Onalaska as a waterfowl refuge and demonstrated an effective collaboration among government agencies and non-government organizations. Further studies of the Lake Onalaska VWAA in the fall of 2004 revealed similar trends in boating activity and disturbance rates (Kenow et al., 2005).

In some areas, waterfowl hunters concentrate along sections of closed area boundaries. The quality of the hunting experience may be lessened in areas where this occurs as waterfowlers compete for prime locations. Other characteristics of these "firing line" conditions include crowding and excessive "skybusting", which can result in an increase in the number of un-retrieved birds.

On a continental scale, the Refuge is a key component of the Upper Mississippi River and Great Lakes Region Joint Venture of the North American Waterfowl Management Plan. The continental plan seeks to restore waterfowl populations to levels observed in the 1970s. The goal of the Joint Venture is to increase populations by habitat enhancement in the area, which includes Wisconsin, Michigan, and parts of Minnesota, Iowa, Illinois, and Indiana. Population objectives are set at 1,542,000 breeding ducks and 773 million duck use-days during fall migration. The goals will contribute to the continental goals of 62 million breeding ducks and 100 million ducks in the fall flight.

Recent fall migration counts reveal a peak in 1998 of nearly 33 million use-days on surveyed areas of the Refuge; more recent years range between 12 and 16 million use days. Joint Venture goals for carrying capacities of fall migration habitat are 500 duck use-day per acre in states with mid-migration habitat (in Illinois) and 200 duck use-days per acre in habitats within production focus areas (Iowa, Minnesota, and Wisconsin).

Refuge closed areas secured an average of 48 to 73 percent of the duck use-days for the period 2000-03. The closed areas of Pools 7, 8, 9 and 13 exceeded the 200 duck use-day per acre goal for divers, but puddle duck goals were met only in the Goose Island closed area of Pool 8 (Figure 15, Figure 16, and Figure 17). Harpers Slough closed area of Pool 9 was the only closed area of the Refuge to exceed the 500 duck use-day per acre goal for waterfowl, in this case it was met for diving ducks.

Other Migratory Birds

Songbirds

Songbirds include a wide array of landbirds such as hummingbirds and woodpeckers, as well as the large order of birds called passerines or "perching" birds. Passerines comprise more than half the world's species of birds and all have a perching foot that includes three toes forward and one toe backward. They range in size from wrens to ravens. Many passerines eat insects as well as fruit, and

Figure 15: Average Number of Duck-use-days per Acre of Closed Area, 2000-2003, Upper Mississippi River Refuge[1]

1. *Abbreviations: PL=Peterson Lake, WE=Weaver Bottoms, PO=Polander Lake, TR=Trempealeau NWR, LO=Lake Onalaska, GI=Goose Island, WI=Wisconsin Islands, HS=Harpers Slough, TM=Twelve Mile Island, ML=McCartney Lake, PC=Pleasant Creek, SL=Spring Lake, EL=Elk River. Data based on aerial surveys, except ground surveys at TR.*

Figure 16: Average Number of Waterfowl (Ducks, Geese, and Swans) Use-days per Acre of Closed Area, 2000-2003, Upper Mississippi River Refuge[1]

1. *Abbreviations: PL=Peterson Lake, WE=Weaver Bottoms, PO=Polander Lake, TR=Trempealeau NWR, LO=Lake Onalaska, GI=Goose Island, WI=Wisconsin Islands, HS=Harpers Slough, TM=Twelve Mile Island, ML=McCartney Lake, PC=Pleasant Creek, SL=Spring Lake, EL=Elk River. Data based on aerial surveys, except ground surveys at TR.*

Figure 17: Puddle Duck Portion of the Average Number of Duck Use-days per Acre of Closed Area, 2000-2003, Upper Mississippi River Refuge[1]

1. *Abbreviations: PL=Peterson Lake, WE=Weaver Bottoms, PO=Polander Lake, TR=Trempealeau NWR, LO=Lake Onalaska, GI=Goose Island, WI=Wisconsin Islands, HS=Harpers Slough, TM=Twelve Mile Island, ML=McCartney Lake, PC=Pleasant Creek, SL=Spring Lake, EL=Elk River. Data based on aerial surveys, except ground surveys at TR.*

include flycatchers, shrikes, vireos, crows, jays, chickadees, nuthatches, tanagers, cardinals, sparrows, and finches.

Prior to the 20th century, songbirds were abundant beyond our imaginations. However, in the last 75 years scientists have documented declines in many songbird species (Terborgh, 1989; Finch, 1991), particularly the "neotropical migrants," those that breed in North America and overwinter in the neotropics of Mexico, Central and South America and the Caribbean. Habitat loss here and there is the main culprit. Nonetheless, the Refuge still provides a vital migration corridor for songbirds, many of which fly thousands of miles each year between Central and South America and the United States and Canada. We estimate that millions of birds migrate through the area each year.

Volunteer "birders" and researchers have documented over 160 species of songbirds, including 32 species of warblers, on the Refuge. "Point count" surveys (Ralph, et al., 1993) have detected a total of 199 species of birds on the Refuge. During the period 1994-2003, observers conducted an average of 323 counts per year. The surveys reveal an average of about 120 species during spring migration (the first two weeks of May are the Refuge's peak spring migration dates), and about 80 species of summer nesting residents (Figure 18). Nesters include the American Robin, Downy Woodpecker, Great-crested Flycatcher, Prothonotary Warbler, Tree Swallow, Yellow-headed Blackbird, Belted Kingfisher, Northern Cardinal, Brown Creeper, and the rare Cerulean Warbler.

The Refuge is developing a cooperative project with U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin to analyze the songbird point count data in terms of bird habitat associations and seasonal abundance. Population trend analysis is pending.

The U.S. Fish and Wildlife Service and various conservation organizations have identified several bird species of management concern that occur on the Refuge (see Appendix K of the Final EIS/CCP for a complete bird list). Five of seven species singled out for priority work by Partners in Flight in its Bird Conservation Plan for Physiographic Region 16 (in which most of the Refuge occurs) are found on or adjacent to the Refuge (Knutson et al., 2001). Some use the Refuge only in migration, others nest there (Table 6).

The U.S. Fish and Wildlife Service's Region 3 identified 26 songbirds as Regional Conservation Priority (RCP) species that occur on the Refuge (Appendix K of the Final EIS/CCP, bird list).

American Bird Conservancy (ABC), a not-for-profit organization, whose mission is to conserve

Figure 18: Average Number of Bird Species Observed and Number of Counts Conducted,1994-99, Upper Mississippi River Refuge

Table 6: Partners in Flight, Physiographic Region 16 Priority Bird Species Found on Upper Mississippi River Refuge Including Seasonal Occurrence and Habitat Associations.

Species	Habitat Association[1]					
	Bottomland Forest	Emergent Wetland	Mixed Wetland - Upland	Prairie	Upland Forest / Bluff	Wet Meadow
Sedge Wren		1,2,3	2	1,2		1,2,3
Golden-wing Warbler	1,		1,	1, 2	1	
Cerulean Warbler	1, 2, 3		1		1, 2	
Black-billed Cuckoo	1, 2	2, 3	2	2	1, 2	
Red-headed Woodpecker	1, 2, 3	1,2, 3	1,2, 3	1, 2, 3	1, 2, 3	

1. 1= spring migrant; 2= summer (potential nesters), 3= autumn migrant

wild birds and their habitats throughout the Americas, produces a "Green List" that contains all the highest priority birds for conservation in the continental United States and Canada (American Bird Conservancy, 2004). This list builds on the Partners in Flight assessments and expands the list to all taxa and divides it into three broad categories. The Highest Continental Concern birds suffer multiple problems and include federally listed threatened and endangered species. The only two species of this category on the Refuge are the Golden-winged Warbler, seen in migration, and the Whooping Crane, recently observed in Refuge floodplain wetlands. The cranes are part of an experimental flock released at Necedah National Wildlife Refuge in central Wisconsin, over the past 3 years.

The second American Bird Conservancy category, Moderately Abundant Species with Declines or High Threats lists birds with relatively high numbers but are declining at an alarming rate. Of this group (see Appendix K of the Final EIS/CCP, bird list), the Refuge harbors 32 species of waterbirds, shorebirds, woodpeckers, warblers, and blackbirds.

The Blue-winged Warbler is the only bird that occurs on the Refuge that is included in American Bird Conservancy's third category, Species with Restricted Distributions or Low Population Size, a group with populations stable and threats apparently limited, but are limited in number or range.

American Bird Conservancy also designates Important Bird Areas that are exceptionally impor-

Figure 19: Number of Colonies and Number of Nests of Great Blue Herons on the Upper Mississippi River Refuge, Selected Years 1960-2005.

tant and essential for bird conservation (American Bird Conservancy, 2004). The goal of the Important Bird Areas program is not just to recognize the sites as important, but also to mobilize the resources needed to protect them. One-third of the areas are on national wildlife refuges.

American Bird Conservancy designated the Upper Mississippi River Refuge a Globally-Important Bird Area in 1997 because it had, at that time, over 70 breeding pairs of Bald Eagles, which was over 1 percent of the United States breeding population; greater than 16,900 Tundra Swans, over 20 percent of the eastern population; and greater than 136,000 Canvasbacks, also over 20 percent of the world's population. Numbers of eagle pairs, swans and Canvasback have been significantly larger in the over the past 5 years. In addition, the Refuge had over 5,700 pairs of Great Blue Herons, concentrations of nesting neotropical migrants, and 78,500 hectares (200,000 acres) of wetlands.

Colonial Nesting Birds

Colonial nesters on the Refuge include species that nest on floating mats of aquatic vegetation, such as the Black Tern, and tree-nesting species, including Great Blue Herons, Double-crested Cormorants, Great Egrets, and Green Herons. The later species nest in small trees and shrubs throughout the Refuge, but little is known of their nesting status.

The herons, egrets and cormorants utilize floodplain forest trees (usually silver maple, cottonwood, or swamp white oak) in colonies (rookeries) containing 15 to 1,000 nests. Colonies are often on islands and/or located in the upper third of the pools where forests are most extensive. Maintenance of the floodplain forest is crucial to sustaining these tree-nesting birds.

A few colonies have been active for 15 or more years. Many colonies are abandoned within a few years and new ones show up taking their places. Great Blue Herons will generally feed near their colony within the floodplain and do not venture near other colonies (Dr. C. Custer, USGS, La Crosse, Wisconsin, personal communication). There are between 12 and 16 Great Blue Heron colonies on the Refuge, supporting a total of about 5,000 nests (Figure 19). In the 1960s there were only about 2,000 nests, but expanded to peak numbers of over 8,000 nest in 1989. The average number of nests between 1999 and 2005 was about 4,100.

Double-crested Cormorants nest in single-species colonies or in colonies shared with Great Blue Herons and Great Egrets. The Refuge's largest concentration of nesting Cormorants occurs on two adjacent islands in lower Pool 13 where more than 1,000 nests have been counted. These islands had only 16 Great Blue Heron nests present in 2003 and 2004. In the remainder of the Refuge, Cormorant nests comprise less than 20 percent of all nests in three or four colonies dominated by Great Blue Herons. Double-crested Cormorants migrate and stage along the Upper Mississippi River where up to 90,000 were observed in the 1940s. Recent counts reveal about 5,000 Cormorants staging on the Ref-

uge in the fall. This species is on the Regional Resources Conservation Priority list.

Great Egrets occur in three to five colonies dominated by Great Blue Herons on the Refuge, with a total of 90 to 400 nests present over the past 3 years. Great Egrets were rarely seen on the Refuge prior to the 1950s.

Black Terns prefer shallow-water marsh and backwater lake habitat with sparse emergent vegetation that consists of water lily, burreed, or bulrush. Dense cattail stands are avoided. Breeding habitat is variable within backwaters and the birds do not necessarily nest in the same area each year but utilize available sparsely vegetated sites. Water level is an important factor, with high water delaying or ending breeding seasons, low water facilitating access to tern colonies by predators. Terns are often in areas generally inaccessible to boaters, except airboats. Custer et al. (1998) indicated that a proposed pool-wide drawdown in Pool 8 could have a detrimental affect on nesting birds but could also enhance wetland habitat for Black Terns. Faber (1992) surveyed Black Terns Pools 4, 5, 6, 7 and 8 and found variable nest success at 7 colonies, influenced by high water and possible mammalian predators, ranging from 0 to 67 percent hatching success. The Black Tern is on the Regional Resource Conservation Priority list.

The American White Pelican is a relatively new, but common, visitor to the Refuge in spring, summer and fall. The bird does not nest on the Refuge. The closest nesting colonies are in western Minnesota (Marsh Lake) and east-central Wisconsin (Horicon National Wildlife Refuge). Large numbers (less than 100) of pelicans first showed up on the Refuge in the early 1980s, with sudden build-ups of more than 1,000 in the mid-1980s. This increase in numbers coincides with a continental increase following the ban on DDT and other pesticides in 1972. The pelican joined other species that are high on the food chain (Bald Eagle, Peregrine Falcon, Great Blue Herons, and Double-crested Cormorants) in making a strong population recovery.

Seasonal aerial and ground surveys since 1994 reveal that flocks ranging from 2 to 600 birds occur at many locations throughout the Refuge (and adjacent Trempealeau National Wildlife Refuge) spring, summer and fall. Refuge-wide, total numbers in the summer have reached nearly 1,500 birds. Aerial survey fall counts peak in late September or early October and have ranged from 442 birds in 1994 to 3,222 in 2001. Prior to 2000, pelicans had departed the Refuge by November 11; since then birds have remained until late November.

While no nesting occurs on the Refuge it is anticipated that pelicans may nest there in the future. Breeders might originate from the western Minnesota colonies, therefore, Refuge staff have color-marked nearly 1,000 flightless young birds at Marsh Lake between 1999 and 2002. Four observations of these color-marked (pink, numbered patagial tags) pelicans have been made on the Refuge and Trempealeau National Wildlife Refuge since then.

The public has indicated a concern that pelicans (as well as Double-crested Cormorants) are consuming game fish or competing with game fish for food. Food habitat studies, which require the collection of birds for stomach analysis, have not been conducted. However, cursory fish sampling in Pools 5 and 7 in 1997 indicated that primarily gizzard shad and shiner minnows were present in areas where pelicans were actively feeding. A few individuals of game fish were also present.

Secretive Marsh Birds

Secretive marsh birds include bitterns and rails that utilize wet meadow and emergent wetland habitats, both of which are declining on the Refuge. Surveys (tape play-backs) conducted during the breeding season, 1994-1999, show that Virginia Rails comprise 70 percent of the secretive marsh birds detected, followed by Sora (20 percent), Least Bittern (7 percent), and American Bittern (2 percent). More recent surveys show that Virginia Rails and Soras have about equal detectability, and the bitterns remain uncommon. The two bittern species are on the Regional Resource Conservation Priority list.

Raptors

Raptors are birds of prey that include vultures, hawks, and eagles. Several species nest on the Refuge and more migrate along the Mississippi River Corridor. The Refuge supports approximately 160 nesting pairs of Bald Eagles (see Endangered Species section), 30 Red-shouldered Hawk pairs, and probably less than 10 Osprey nest sites.

Red-shouldered Hawk breeding populations in the midwestern states have declined since the 1960s. The floodplain of the Upper Mississippi River provides habitat for nesting Red-shouldered Hawks. Nest territories on the Upper Mississippi River floodplain typically are in blocks of mature timber greater than 500 acres in size (nests may be found

on the edges of the blocks), include both floodplain and upland slope forest types within the tract, are within 200 yards of ponds or small streams, and are greater than 500 yards from the main channel (Stravers and McKay, 1994). These investigators recommended to restrict logging in nesting areas, avoid fragmentation of large forest tracts, allow some thinning of younger forest stands to assist in development of overhead canopy cover, and combat invasion of reed canary grass that might inhibit growth of cottonwood and silver maple.

The fall raptor migration along the river corridor has been monitored along the bluffs adjacent to Pools 4, 5A, 8, 10 and 13. Migration data can be used to monitor raptor populations but surveys on the Upper Mississippi River are inadequate to reflect population trends in the Midwest. In the mid-1990s, observers at Eagle Valley Nature Preserve, Glen Haven, Wisconsin, (on bluffs overlooking Lock & Dam 10), documented between 14,600 and 30,700 raptors, of 17 species, during standard observation periods (Mandernack, et al. 1997). Peak daily counts totaled over 1,000 individuals on three different occasions. Four species comprised 87 percent of the count in 1996: Bald Eagle, Broad-winged Hawk, Sharp-shinned Hawk and Red-tailed Hawk. The majority of the migration occurs from mid-September to mid-October.

The Bald Eagle, Northern Goshawk, Red-shouldered Hawk, and Peregrine Falcon occur on the Refuge and are on the Regional Resource Conservation Priority list.

Fish

The Refuge supports at least 119 species of fish, including sport fish (a $250 million industry riverwide), commercial fish (a $5 million industry), forage fish (gizzard shad, minnows and other small fish on which predatory fish feed), ancient fish (paddlefish and sturgeon), and many other unique species that make the river's fishery so diverse (Gutreuter and Theiling, 1999). Populations of at least 41 fish species are in such poor shape that they are listed as threatened or of concern by state or federal agencies along the Upper Mississippi River (see Appendix K of the Final EIS/CCP). Loss of habitat, the navigation system, over-exploitation, and impacts of exotic species (see discussion below) are the main causes. Pools 4, 8 and 13 each support 55 to 80 species of fish, as determined from recent surveys.

Unlike most Refuges, Congress established the Upper Mississippi River Refuge (1924) for both fish

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and wildlife, not just wildlife as in most cases. Specific concern was noticed over fish being stranded due to low water conditions (see discussion below), the lack of habitat for black bass (largemouth bass), and prospects of converting the floodplain to agriculture. During this period prior to locks and dams, the river was free flowing and fish migrated north and south. The most prevalent fish were species adapted to river flow, such as walleye, skip-jack herring, paddlefish, sturgeon, and catfish. Buffalo fish and catfish were primary commercial fish at the time.

Species that required ponded, slack-water habitats, such as bass, northern pike and sunfish were present but not as common. Unfortunately, the northerns and bass would get stranded when floodplain ponds dried up in the summer. In fact, a major function of the Refuge in the 1920s was to "rescue" these fish, sometimes netting hundreds of thousands of pounds, some shipped by train across the country, others released in area lakes and rivers. With construction of the locks and dams, flooding solved the stranding problem and since then backwater fish have become abundant.

Sport Fish

Favorite sport fish on the Refuge include walleye, sauger, white bass, largemouth bass, smallmouth bass, channel catfish, northern pike, bluegill, and crappies. Fishing tournaments are ever-increasing and may put extra pressure on local fish populations. The following fish species accounts are largely based upon data supplied in the Upper Mississippi River Conservation Committee's Fisheries Compendium, Third Edition (UMRCC, 2004a).

Walleye populations flourish in the Upper Mississippi River due to high quality habitat meeting life requirements. Recent creel surveys show they rank third in harvest behind white bass and sauger in Pool 4. A 15-inch length limit, implemented in 1990, has increased harvest weights by 50 percent on Pools 11 and 13, as well as catch rates. Upper Mississippi River Conservation Committee biologists concluded in the 2004 report that a continuous open season on walleye should continue on the Upper Mississippi River while agencies continue to monitor population trends. Similar conclusions were made concerning sauger populations on the Upper Mississippi River.

Summer creel surveys of white bass in Pools 11 and 13 from 1993 to 2000 showed the species ranked from third to seventh in the annual numerical harvest. On the Upper Mississippi River, creel limits are liberal, as over-harvest does not appear to be a problem.

Prior to locks and dams, prime smallmouth bass fishing grounds were found between Wabasha and Minneapolis, Minnesota, and near Lansing, Iowa. Presently, smallmouth bass populations in Pools 1-14 are increasing and are a significant component of the fishery. This species is prominent in bass tournaments. For example, Minnesota's records of four tournaments held between 1996 and 2000, show that all the largest fish were smallies (20 to 21.5 inches long) and 66 to 85 percent of the bass caught were also smallmouths. The public is showing interest in managing this species separate from largemouth bass (UMRCC, 2004a).

Recent creel surveys show that largemouth bass ranked second to fifth in numeric harvest in backwater complexes of the Upper Mississippi River. This species is the number one preference of anglers fishing in backwater habitats. Catch and release has become a common practice; of 19,000 largemouths caught by interviewed anglers, 87 percent were released. Largemouth bass are intensively managed by state agencies. In 1991, a 14-inch minimum limit was established. "Under present conditions, it appears that largemouth bass are not being over-harvested, except possibly during winter where bass are concentrated in over-wintering areas and are subject to high angling pressure. Harvest regulations between adjoining states should attempt to be uniform if possible" (UMRCC, 2004a).

Bluegills are the number one harvested fish species of the Upper Mississippi River backwaters. Loss of suitable spawning and over-wintering backwaters due to sedimentation poses the most serious threat to bluegill survival. Overwinter survival is directly related to sufficient oxygen level and sufficient water depth to maintain ingress and egress under thick ice and snow cover. Preferred winter habitat for bluegill on the Upper Mississippi River contains depths in excess of 3 feet, temperatures above 34.7 degrees Fahrenheit, and no continuous flow (UMRCC, 2004a). Quality sized bluegill (> 7 inches) in Pool 5 and 5A backwaters experienced over 80 percent percent winter angling exploitation in 1997-98. Bluegills are very prolific and therefore have few harvest restrictions, although there is a 25 bag limit on the Minnesota-Wisconsin border waters. Minnesota has an experimental bag limit of 10 fish daily on the Minnesota side of Pools 5, 5A, and 8. The lack of uniform regulations between states has created recurrent controversy between anglers and biologists in areas where restrictive bag limits exist (UMRCC, 2004a). Bluegills are an important prey species for flathead catfish, largemouth bass, and bowfin. They are host to 14 species of mussels found in the Upper Mississippi River.

Recent creel surveys of various pools of the Upper Mississippi River show that crappies ranked as one of the top two most harvested sport fish. Data from 1990-1997 reveal abundance is variable and no observable trend in population. No new changes in regulations of crappie harvest are recommended at this time (UMRCC, 2004a).

Other Fish

Paddlefish

The paddlefish is one of the ancient fish of the Upper Mississippi River and is distinguished from all other fish by its broad, flat bill-like snout. It may weigh up to 90 pounds. They spawn in flowing water. People consume paddlefish meat and roe (caviar). The worldwide protection of sturgeon species in 1998 is expected to have a dramatic impact on commercial paddlefish harvest by creating a greater demand for paddlefish caviar as a surrogate to sturgeon roe. It has declined throughout its range due to habitat loss and over-harvest. Its northern-most range on the Upper Mississippi River is in the Minnesota – Wisconsin border area. They migrate along the Upper Mississippi River and will move between pools, usually over dams in high water. They feed on plankton in both fast flowing main channel areas and in the backwaters. Competition from invasive species such as silver and big head carp, plankton eaters, is a potential serious threat to paddlefish if

these species move up the Upper Mississippi River (UMRCC, 2004a). Paddlefish are a protected species in Minnesota and Wisconsin.

Sturgeon

Included in the list of "ancient species" three kinds of sturgeon inhabit the Upper Mississippi River: the lake, pallid and shovelnose. These species date back to 50 million years ago. The pallid sturgeon is endangered and occurs in waters well south of the Refuge. Lake and shovelnose are rare or uncommon in most Refuge waters, but the shovelnose can be an important commercial species in some areas.

The shovelnose feeds on aquatic insects and fish, and grows to about 24 inches. They spawn on gravel in fast flowing water. They are harvested for their meat and roe. Shovelnose populations are limited due to over-harvest, habitat degradation, and water pollution of the last century. Flow alteration and habitat fragmentation by dams has jeopardized the long term health of the species. However, present commercial harvest of sturgeon on the Upper Mississippi River does not appear to be affecting shovelnose. The shovelnose is the host to three species of mussels and is the only known host of the hickorynut mussel, which inhabits water of 3.9-5.9 feet deep over sand or gravel in good current. This coincides with shovelnose sturgeon habitat (UMRCC, 2004a).

A framework for the management of paddlefish and sturgeon in the United States was developed under the auspices of the U.S. Fish and Wildlife Service, National Paddlefish and Sturgeon Steering Committee. Eleven management recommendations were made but little funding is available to address these issues. Sturgeon management on the Upper Mississippi River should focus on: 1) structural habitat features, 2) alterations of flow variability necessary to maintain and enhance natural and manmade habitat, 3) harvest restrictions, and 4) supplementation of population numbers through aquaculture (UMRCC, 2004a).

Invasive Fish

See Section on page 68 for a discussion of invasive fish species.

Fish Passage

Fish that migrate in rivers are classified as potamodromous. There are at least 34 species of fish that migrate on the Upper Mississippi River, some of which include: paddlefish, sturgeon, gar, skipjack herring, suckers, redhorse, channel catfish, flathead catfish, northern pike, white bass, largemouth bass, smallmouth bass, walleye, sauger and freshwater drum.

Locks and dams disrupt the ecological integrity of the river systems and have been implicated in the decline of numerous fish species (UMRCC, 2004a). These structures restrict upstream movement of fish, alter migration behavior, and impede access to foraging habitat and wintering areas. The Upper Mississippi River System dams create a head and current velocity that exceeds the swimming speed (about 1-4 feet per second.) of most fish known to migrate in the Upper Mississippi River. Current velocities are sufficiently low when the dam gates are out of the water during high discharge conditions to allow some fish to move upstream.

Fish passage can be enhanced with modifications to operation of the dam gates, locking fish through a dam similar to boat lockage, modifying water level management plans (to allow longer periods of open river conditions), and modifying the lock filling and emptying system. Structural alternatives include Denil fishways, fish elevators, and bypass channels. It is recommended that if fishways are selected they first be done on an experimental basis and selected on physical, biological, and economic factors, and in the interest of management partners (UMRCC, 2004a).

Freshwater Mussels

There are 297 species of freshwater mussels in North America. About 50 species have been recorded on the mainstem of the Upper Mississippi River. A recently completed Conservation Plan for Freshwater Mussels of the Upper Mississippi River System (UMRCC, 2004b) says that "no other group of animals in North America is in such grave danger" of population declines and extinctions. In North America, it is estimated that 55 percent of the freshwater mussel species are in danger of extinction and only 25 percent are considered stable. Over-exploitation, water pollution and habitat alteration are responsible.

Prior to the 1800s, an estimated 44 species occurred on the Refuge portion of the Upper Mississippi River. Since then, five species have been extirpated, and four are extremely rare (Appendix K of the Final EIS/CCP) (Mike Davis, Minnesota Department of Natural Resources, personal communication). The remaining 39 species that occur in the Refuge (Pools 4-14) vary in distribution from

localized populations (e.g. mucket in Pool 11) to Refuge-wide occurrences (e.g. pink papershell and giant floater).

The main mussel beds found on the Refuge occur in main channel areas, secondary channels, and adjacent backwater habitats. The East Channel area at Prairie du Chien Wisconsin (Pool 10) is historically the premier mussel bed of the Refuge. It suffered near-catastrophic loses due to zebra mussel infestations in the late 1990s and early 2000s (see Invasive Species section). General locations of crucial mussel beds for Higgins eye pearlymussel are described above in the section on Candidate, Threatened and Endangered Species. Some of the historically important mussel beds of the Upper Mississippi River that occur on the Refuge are:

Winters, Wisconsin – Pool 7
Harpers Slough, Iowa – Pool 9
Whiskey, Iowa – Pool 9
East Channel, Wisconsin – Pool 10
McMillian, Iowa – Pool 10
Cassville, Wisconsin – Pool 11
Bellevue, Iowa – Pool 13
Cordova, Illinois (near Refuge) – Pool 14.

An unexplained massive mussel die-off occurred in 1983-1985 between La Crosse, Wisconsin, and Hannibal, Missouri. This unknown aspect of mussel ecology stimulated further agency cooperation and mussel research that continues today (Tucker and Theiling, 1999).

The endangered species, Higgins eye pearlymussel, and the candidate species, spectaclecase and sheepnose, occur within, or near the Refuge. See Section and Section for a full description of their status.

Reptiles and Amphibians

There are 22 species of reptiles and 13 species of amphibians that occur on the Refuge (Appendix K of the Final EIS/CCP). See the section on Candidate, Threatened and Endangered Species for a discussion of massasauga rattlesnake on the Refuge.

Turtles

Our most current reptile information concerns the 11 species of turtles found on the Upper Mississippi River. Some turtle species prefer the river's quiet backwater habitats (such as Blanding's, painted, snapping and common map turtles) while others occupy more riverine or faster flowing waters (smooth and spiny softshells, and Ouachita and false map turtles). The Blanding's turtle population is threatened in states bordering the Upper Mississippi River, but one of its largest populations in the world is located on the Minnesota side of Pool 5 and is found on Refuge, state and private lands. "Turtle crossing" caution signs are posted where Blanding's must cross county roads during their annual trek from shallow wetlands to nesting sites in local sand dunes.

Good turtle habitat along the river proper includes sandy shorelines (nesting habitat) that border the main navigation channel and are close to backwater marshes (hatchling nurseries). Potential human conflicts occur when people camp and picnic, or where channel maintenance dredge material is piled for storage on sandy beaches used by nesting turtles. An added threat comes from egg-eating predators, particularly raccoons, which are extremely efficient in finding nests concentrated in areas where prime sand and moisture conditions prevail.

Research and habitat modeling work is needed to determine baseline information on the distribution (current and historical), relative abundance, and reproductive success of turtles on the Refuge. Concerns about harvest rates and population levels of snapping turtles lead to radio-telemetry studies of snappers by Wisconsin Department of Natural Resources in 1997-2001 (Andersen, 2003). Investigators found survival rates to be high; average home ranges were between about 50 and 108 acres in size; hibernation sites were in various habitats but mostly in backwaters and secondary channels in depths of 0.1 to 5.6 feet; woody structure is important in winter and summer habitat; snappers utilized runs and lodges of muskrat and beaver; and the turtles have strong homing abilities. Public educational materials will be produced, emphasizing the need to protect adult females and inform harvesters how to distinguish males and females.

Investigations are also needed to determine human impacts of operation and maintenance of the 9-foot navigation channel project and of recreational use of sandy islands and shorelines. Results of studies will be used in developing science-based turtle management on the Refuge.

The conservation of riverine turtles is a worldwide problem in which this group of turtles is subject to over-exploitation, habitat alteration, run-off and siltation, changes in predator populations, and alteration of river flows through dams, wing dam

Table 7: Occurrence of Frogs and Toads on Upper Mississippi River Refuge, 1994 to 2004

District	No. of Routes	No. of Survey Years	Number of Years Species Detected										
			Wood Frog	Chorus Frog	Spring Peeper	Leopard Frog	Pickerel Frog	Am. Toad	East Gray Tree	Copes Gray Tree	Cricket Frog	Green Frog	Bull Frog
Winona	1	7	1	3	6	2	2	6	6			5	
La Crosse	3	11	7	11	11	11	6	11	11	4	3	11	1
McGregor	2	10	1	10	10	10	3	10	10	4	7	10	10
Savanna	2	11		10	10	10	1	9	11	11	11	11	11

and channelization (Moll and Moll, 2000). These authors recommended conservation measures to include establishment of sanctuaries, protection of nest areas and hatcheries, public education, and captive breeding.

Frogs and Toads

Nine species of frogs and one toad occur on the Upper Mississippi River. Current Refuge knowledge of frog and toad distribution on the Refuge is based upon call surveys conducted by staff and volunteers. An extensive long term monitoring study is being conducted by Dr. Walt Sadinski of the Upper Midwest Environmental Sciences Center in La Crosse, Wisconsin, as part of the nation-wide Amphibian Research and Monitoring Initiative (ARMI).

Standardized frog and toad surveys were initiated on the Refuge in 1994 due to concern about the apparent rarity, decline and/or population die-offs of certain species in the surrounding states. Populations of these amphibians serve as an index to environmental quality. Survey routes consist of 10 wetland sites which are visited 3 times annually. Observers identify species present, based on their calls, and make simple estimates of abundance. The survey periods and corresponding minimum water temperatures (Wisconsin) are April 15-30, 50 degrees Fahrenheit; May 20-June 5, 60 degrees Fahrenheit; and July 1-15, 70 degrees Fahrenheit. Eight routes are surveyed most years (Table 7).

The bull frog occurs in all Districts but has not been detected on survey routes in the Winona District. Detection rates of wood and pickerel frogs are lower than other species on the Refuge. In addition, Blanchard's cricket frog has not been detected on survey routes but three individuals were heard by herpetologists visiting the Refuge near Winona, Minnesota, during the summer of 2004.

Invasive Species

Invasive and exotic species are the "greatest threat to ecosystem integrity within the refuge system" (USFWS, 2004a). The Refuge and Upper Mississippi River System are inundated with invasive fish, plants, and invertebrates. Invasive species are those that dominate an ecosystem at the expense of other species, causing population crashes and ecological changes. These species invade or increase within the ecosystem as the result of a disturbance or degradation of the natural system. A healthy native system usually will not experience the invasions. Many invasive species are not indigenous (native) to North America, but are imported intentionally or by accident from another continent. Newly arrived species often exhibit population explosions due to lack of competition or natural control.

Examples of invasive species threatening wildlife populations and habitat are varied. Native mussels, particularly the Higgins eye pearlymussel, are threatened by zebra mussels imported from Europe via ship's ballast water (USACE, 2004a). Asian carp threaten native paddlefish via competition for plankton. These carp also can potentially eliminate vegetation beds, snail and mussel populations, and deplete the commercial fishing industry on the Upper Mississippi River System.

Invasive Fish

An ever-increasing list of uninvited fish to the Upper Mississippi River is cause for alarm by anglers, commercial fishermen, ecologists, biologists, and others who also admire the river. Exotic fish originate from other parts of the world and

these fish eat other fish, out-compete native fish for food, can wipe out vegetation beds, and even cause bodily harm to boaters.

The common carp, a native of Europe and Asia, was first found in the Upper Mississippi River in 1883 and presently comprises most of the commercial harvest of fish in the Upper Mississippi River. It has increased in abundance in Pools 4, 8, 13, and 26 of the Upper Mississippi River from 1990-94 (Gutrueter and Theiling 1999). As the common carp increased, the native buffalo fish, the ecological equivalent, has declined in the harvest by about 50 percent.

Four species of asian carp (big head, black, silver, and grass) were imported to control weeds, snails, or plankton at fish farms. They escaped the farms and are moving from southern United States into the river basin (UMRCC, 2004a). They are large, voracious eaters that consume so much they could even affect aquatic life beyond just fish, including waterfowl, clams and mussels, and marshbirds. The bighead carp, a plankton eater in competition with paddlefish, buffalo fish and gizzard shad, and larval forms of native fish, can grow to 90 pounds. The silver carp, another planktivore grows up to 110 pounds. When bothered by sounds of a boat motor, silver carp often jump 4-6 feet or more out of the water, literally landing in boats or crashing into people, causing bodily harm.

Another invasive fish, the round goby, will likely be a species of concern in the near future. These small but voracious fish are already halfway down the Illinois River, having moved from Lake Michigan.

Control of these invasive fish is crucial to retention of the river's ecological integrity. The Corps of Engineers has recently installed an electrical aquatic nuisance species dispersal barrier in the Chicago Sanitary and Ship Canal to prevent interbasin movement between the Great Lakes and the Upper Mississippi River. However, exotic species have passed the barrier and a second barrier further downstream will be installed in the spring of 2005 (UMRCC, 2004a). Findings of a recent feasibility study funded by Minnesota Department of Natural Resources noted "that an acoustic deterrent such as a Sound Projector Array based acoustic bubble curtain downstream of a lock location perhaps in conjunction with attractants (i.e. pheromones, plankton, lights, etc.), and an integrated management/harvest plan may provide the most feasible opportunity to limit or slow the upstream invasion of Asian Carp" (FishPro, 2004).

Control of these species and prevention of additional invasions will be addressed in Refuge step-down plans for fish, wildlife, and habitat management. Control will only be achieved through cooperative efforts of all agencies and partners on the Upper Mississippi River System. A potential avenue of cooperation in control of invasive species is through the Mississippi River Basin Aquatic Nuisance Species Panel (UMRCC, 2004a).

Invasive Plants

Of the 591 plant species known to occur within the Upper Mississippi River, 36 are not indigenous to North America (Appendix K of the Final CCP/EIS). Approximately 15 of these non-native species and aggressive native species adversely affect Refuge native plants and habitat (Table 8). Native species, such as reed canary grass, can take on invasive qualities when natural processes like fire, drought, and flooding are altered. Over the past five years, the Refuge has attempted to control several plant species using various techniques, including biological control, mowing, cutting, exchanges of ornamental plants, and the use of herbicides.

It is estimated that purple loosestrife has invaded thousands of acres of the Refuge, replacing large blocks of native vegetation, decreasing species diversity, and affecting local wildlife populations by reducing available wetland habitat. Control efforts include the release of beetles (*Galerucella* sp. and *Hylobius* sp.) that consume only this plant. Success in controlling loosestrife via biological methods, and restoring native plants has been documented throughout the Refuge. Each Refuge District has raised beetles in nurseries and conducted beetle "releases" to control loosestrife over the past decade. Releases have ranged from 500 to 20,000 beetles per site. The herbicide glyphosate was used in the 1990s throughout the Refuge and was used in 2002 on a limited basis in the Savanna District.

No control efforts are under way to combat Eurasian milfoil, other than through public education efforts that encourage people to remove all vegetation from their boats and boat trailers upon exiting the water. This combats spread of the plant between water bodies.

Reed canary grass ecotypes of both native and non-indigenous origins have invaded Refuge wetlands. It is virtually impossible to distinguish native from non-native plants. This species is preventing

Table 8: Invasive Plants and Their Control on the Upper Mississippi River Refuge

Plant Name (Native or non-native)	Scientific name	Control method	Comments
Purple loosestrife (non-native)	*Lythrum salicaria*	Beetles (*Galerucella* and *Hylobius*) pulling, herbicide (glyphosate)	Large-scale, Refuge-wide problem. Biological control is effective.
Eurasian milfoil (non-native)	*Myriophyllum spicatum*	Public education to prevent spread to other bodies of water	Wide-spread, but not considered a major threat to aquatic habitats
Spotted knapweed (non-native)	*Centaurea maculosa*	Mowing	Increasing problem in Sand prairies
Garlic mustard (non-native)	*Alliaria petiolata*	Pulling	Widespread in shady upland habitats
Reed canary grass (native and non-native ecotypes)	*Phalaris arundinacea*	Root Pruned Method (RPM) trees; mowing	Wide-spread problem; threat to forest regeneration
Crown vetch (non-native)	*Coronilla varia*		Widespread
Siberian or Chinese elm (non-native)	*Ulmus pumila*	Cutting; herbicide (Triclopyr)	Localized problem
Honey locust (native)	*Gleditsia tricanthos*	Cutting; herbicide (Triclopyr)	Localized problem
European (common) buckthorn (non-native)	*Rhamnus cathartica*	Cutting; herbicide	Widespread
Leafy spurge (non-native)	*Euphorbia esula*	Biological control	Localized problem
Black locust (native, imported from Appalachia and the Ozarks)	*Robinia pseudoacacia*	Cutting; herbicide	Localized problem
Japanese Bamboo (Japanese knotweed)	*Polygonum cuspdatum*	Pulling; grubbing roots; herbicides	Localized problem
Bush Honeysuckles (non-native)	*Lonicera tatarica and others*	Pulling; herbicides	Localized problem

regeneration of native forest trees and other floodplain vegetation (UMRCC, 2002). Mowing and the use of mats around planted trees controls competition and discourages voles that may girdle newly planted trees. Experimental control using soil scarifying techniques, followed by herbicide treatments, have been attempted in cooperation with the U.S. Army Corps of Engineers at small timber harvest areas of the Refuge. The Refuge is supporting research to develop an effective means of stopping the spread of reed canary grass.

Illinois garlic mustard invades woodland habitats, smothering most of the native herbaceous vegetation. It occurs on higher sites of the floodplain forest (e.g. Goose Island in Pool 8 and Potosi River delta of Pool 11) in Pools 8-14. Control efforts have included the use of herbicides and pulling operations.

Invasive Invertebrates

The zebra mussel is a threat to native mussel populations. Based on North American studies, zebra mussels are believed to impact native mussels by interfering with siphoning, feeding, gamete release, reproductive displays, and respiration. This species presumably was brought to North America from Europe in ballast water of ocean-going vessels. In 1991 the zebra mussel was found first in the Upper Mississippi River and Refuge near La Crosse, Wisconsin (UMRCC, 2004b). Since their appearance, zebra mussel populations have

Figure 20: Average Number of Zebra Mussels per Meter Square Collected During Fall Sampling Periods in Selected Areas of Pools 7, 8, 9, and 13, 1997-2005, Upper Mississippi River Refuge

expanded exponentially, sometimes reaching population densities of 60,000 per square meter (on Pool 13).

The native mussel community of Pool 10 at Prairie du Chien, Wisconsin, (East and West Channels) was valuable and well known to biologists and commercial mussel fishermen. In particular, this area was considered to be the most valuable Essential Habitat Area for the federally endangered Higgins eye pearlymussel. In the late 1990s, the native mussel community at Prairie du Chien was devastated by zebra mussels. Zebra mussel densities in the East Channel rose dramatically from 2 per square meter in 1993 to 56,507 per square meter in 1999. Consequently, density of native mussels in the East Channel fell from 59.2 per square meter in 1996 to 1.7 per square meter in 1999; no juvenile native mussels were found between 1999 and 2001.

Like the rest of the mussel community there, the abundance of Higgins eye pearlymussel in the East Channel drastically declined with the expanding zebra mussel population. Zebra mussel population assessments are an important component of the Higgins eye pearlymussel recovery plan.

Zebra mussels have appeared in bottom samples collected by the Refuge and states during the fall to assess available food sources for migrating waterfowl in Pools 2-13. These samples come from both open water and backwater habitats. Peak numbers of zebra mussels in Pools 7, 8, 9, and 13 appeared in 2000 (Figure 20). Maximum average densities ranged from 1,500 to 5,000 per meter square. Numbers declined throughout the Upper Mississippi River in 2001, probably due to warm water conditions and the stresses of flooding. Numbers have risen since 2004 and 2005. Zebra mussel numbers were sparse in Pools 4, 5, 5A, and 11 throughout the 1997-2005 period.

The faucet snail or mud bithynia (*Bithynia tentaculata*) is an invasive snail first introduced to the Great Lakes in about 1870 from Europe (Scandinavia to Greece), possibly with packing material. This snail is an intermediate host for two intestinal trematodes (flukes), *Sphaeridiotrema globulus* and *Cyathocotyle buchiensis* that cause mortality in waterfowl and coots. The incidence of trematode-infected faucet snails collected in bottom samples has reached over 50 percent in some parts of Lake Onalaska (Pool 7).

Bird mortality caused by these trematodes was first detected in the spring of 2002 when one lesser scaup was found dead in upper Pool 8. In the fall of 2002, the trematodes killed an estimated 1,500 to 1,900 diving ducks and Coots on Pool 7 and 8. In the same season, nearly 100 Coots and diving ducks were collected in open water between Ferryville and Lynxville, Wisconsin, on Pool 9. Spring and fall die-offs also occurred on Pools 7 and 8 in 2003, killing an estimated 8,000 waterbirds. Species affected include Lesser Scaup, Ring-necked Ducks, Canvasback,

Figure 21: Average Number of Mayflies per Meter Square Collected During Fall Sampling Periods From Selected Areas on Pools 7, 8, 9 and 13, 1995-2003, Upper Mississippi River Refuge

Figure 22: Average Number of Fingernail Clams per Meter Square Collected During Fall Sampling Periods From Selected Areas on Pools 7, 8, 9 and 13, 1995-2005 Upper Mississippi River Refuge[1]

1. High values for Pool 9 are: 1995 (5,985); 1996 (5,856); 1997 (3,790).

Bufflehead , and Coots. Raptors that scavenge these birds are not susceptible to the trematodes.

Researchers and managers are investigating potential actions to prevent major die-offs caused by the presence of this snail. Population monitoring and removal of bird carcasses is a continuing practice.

Other Aquatic Invertebrates

Aquatic invertebrates play an important role in fish and wildlife ecology on the Refuge and are a useful indicator of environmental quality. Fingernail clams and burrowing mayflies are often target organisms of studies and monitoring. They are important foods in the Upper Mississippi River System for diving ducks, sport fish and commercial fish. Declines in diving ducks using the Illinois River valley during the 1950s was attributed to the loss of the fingernail clam community (Sauer and Lubinski, 1999). Long-term monitoring on the Upper Mississippi River System shows that Pool 13 backwaters have held the highest densities of mayflies and fingernail clams, possibly because Pool 13 is outside the pollution gradient that extends downstream

Figure 23: Number of Beaver Harvested, 1990-91 Through the 2004-2005 Seasons, Upper Mississippi River Refuge[1]

1. Note that 1991-1992 data are not included in this figure.

from Minneapolis, Minnesota, and that Pool 13 substrates are especially suitable for these critters.

The Refuge and the states sample invertebrates in the fall to assess available food sources for migrating waterfowl in Pools 4-13. Our most complete data are for pools 7, 8, 9 and 13. Mayfly numbers are generally highest in pools 8, 9 and 13 (Figure 21). Off-refuge data from pools 2 and 3 show even higher mayfly densities. Fingernail clam numbers are ususally greatest in Pool 9 (Figure 22). Values for both fingernail clams and mayflies in pools 4, 5, 5A, 10, 11, and 12 are consistently much lower than the pools listed above. Differences in invertebrate densities between pools is often controlled by local conditions and not necessarily due to whole-river factors (Sauer and Lubinski, 1999).

Refuge data indicate that when fingernail clam densities exceed about 200 clams per meter square, diving duck use-days on that pool can exceed 500,000 use-days or peak numbers over 80,000 birds. Data also indicate that fingernail clams were abundant in years when submerged aquatics were lacking during the early 1990s and were crucial to migrating diving ducks during those years.

Mammals

The 51 species of mammals that occur on the Refuge (Appendix K, Final EIS/CCP) play an important role in Upper Mississippi River System ecology and some are the object of furbearer management on the Refuge. Prior to locks and dams, the high, semi-dry river bottoms held higher populations of skunk, badger, foxes, and rabbits than occur at present. The marsh conditions of today now support higher numbers of muskrat, mink, and especially raccoon than in the past.

Furbearing mammals (beaver and river otter) were key elements in the development and exploitation of the Mississippi River Basin. Early explorers and trappers established settlements (Prairie du Chien, Wisconsin, for example) to carry on the fur trade. Over-exploitation nearly extirpated beaver from the Upper Mississippi River by the mid-1800s. They made a comeback in the 20th century with reintroductions (1927 and 1928), control of the harvest, and new habitat created by the lock and dams in the 1930s. Beaver lodges and cuttings are now a moderately common sight on the Refuge. About 2,100 beaver are harvested each year (1990-2003) (Figure 23).

Beaver lodge surveys conducted in Pools 12-14 from 1993 to 2002 revealed an average of 41 lodges per year along established survey routes. Numbers ranged from a high of 62 in 1993 to a low of 20 in 2002.

River otter were also trapped extensively at the time of early European settlement. These predators probably maintained small populations in tributaries of the UMR. Today they are an uncommon sight, but occupy most areas of the Refuge, as evidenced by trapping records, local observations, and radio-tracking studies.

Currently, Wisconsin is the only state that allows the take of river otter on the Refuge, one per sea-

Figure 24: Number of River Otter Harvested Between 1997-1998 and 2004-2005, Upper Mississippi River Refuge

son. Otter are taken incidentally on the Refuge in Minnesota, Iowa, and Illinois for which State conservation officers may allow retention of the fur on a case by case basis. Since 1997, an average of 28 otter have been trapped on the Refuge, ranging from 13 to 46 animals per season (Figure 24). Approximately 90 percent of the otter harvested on the Refuge are taken in Wisconsin. In the past eight years, the state-wide annual otter harvest in Wisconsin has been about 2,000 animals, except in 1998-99 and 2003-04 when it was near 1,500 otter.

The State of Minnesota is investigating home range characteristics, habitat selection and survival of river otters in southeast Minnesota and portions of the Refuge (T. Gorman, student at Mankato State University, personal communication). Data from this study will be used in decisions whether to have a trapping season on these animals in southeastern Minnesota. Preliminary reports indicate radio-tracked river otters established natal dens along fence rows and up to several miles away from streams. Investigators reported four of 24 radio-marked otters died of incidental take; one of 24 was a road-kill mortality.

Prior to locks and dams, muskrats were widespread, but not abundant on the Upper Mississippi River System. At that time the shallow lakes and marshes often dried up each fall, forcing muskrats to dig bank dens, rather than build typical "rat houses". Muskrats flourished after the 1930s when permanent shallow wetlands were created by installation of the locks and dams. High muskrat numbers coincided with those of puddle ducks, bitterns and rails, sunfish and bass in the hey-day of shallow wetland productivity witnessed in the 1935-65 period. Since then, the decline of cattail, burreed, arrowhead, and bulrush has resulted in reductions in muskrat populations, although "rats" still utilize muddy banks along the many side channels now coursing through the bottomlands.

Trappers have harvested millions of muskrats from the Refuge since the 1940s. Between 1940 and 1970, over 2.25 million rats were harvested (average of 83,000 per year) by an average of 750 Refuge-permitted trappers per year. Recent annual harvest reports (1991-2004) show about 40,000 animals taken by 290 trappers per year (Figure 25 and Figure 26). Muskrats reproduce prolifically and changes in their populations generally reflect ebb and flow of habitat, rather than the extent of harvest.

Recent population status and distribution data are available from studies, inventories, and fur catch reports submitted by trapping permittees. Muskrats were studied in the early 1980s in Pool 9 to determine density, survival and harvest rates (Clay and Clark, 1985). The authors reported that muskrat populations on Pool 9 "showed the characteristic resiliency for the species with great reproductive capability and consistent survival." They also found that distribution and harvest was not uniform, which support the idea of management by zones to provide sustained harvest.

Figure 25: Number of Muskrats Harvested, 1990-91 Through 2004-2005 Season, Upper Mississippi River Refuge[1]

1. *Note that 1991-1992 data are not included in this figure.*

Figure 26: Number of Active Trappers, 1990-91 Through the 2004-2005 Season, Upper Mississippi River Refuge[1]

1. *Note that 1991-92 data are not included in this figure.*

Are muskrat harvests affected by water level fluctuations? Regression analyses said "no" in tests of water levels (at tailwaters and headwaters) in Refuge Pools 4 through 14 compared to muskrat harvest for the period 1990 and 1992 to 1996 (Wlosinski and Wlosinski, 1998). The authors concluded that water levels did not affect muskrat harvest on the Refuge, but noted that numerous other studies showed that muskrat populations are affected by water levels. Other factors affecting harvest include length of trapping season, fur prices, weather conditions, habitat changes, and trapping effort. The authors concluded that "although sometimes used as a surrogate for population estimates, harvest may not be a good estimator for muskrat populations." The same authors reported that the

Figure 27: Number of Raccoon Harvested, 1990-91 Through the 2004-2005 Season, Upper Mississippi River Refuge[1]

1. *Note that 1991-92 data are not included.*

Figure 28: Number of Mink Harvested, 1990-91 Through the 2004-2005 Season, Upper Mississippi River Refuge[1]

1. *Note that 1991-92 data are not included.*

average number of muskrats trapped is positively correlated to differences in aquatic vegetation coverage estimates (1989 emergents and floating leaved aquatics).

In 1988, the Wisconsin Department of Natural Resources began making annual muskrat house counts at specific locations within Pools 4-11 (WDNR, 2004). Fewer houses have been found in the past four years compared to 1989-91. Counts are on the rise in the last 2 years, however. These data reflect variability observed in trapping data over the past 40 years.

The recent (1990-2003), average annual raccoon harvest on the Refuge has averaged 1,793 animals, ranging from 800 to over 3,000 per year (Figure 27). Raccoon numbers have increased dramatically since the early 1990s in each of the four states in which the Refuge occurs. Scientists estimate that there

are more raccoons in Illinois today that when the first European settlers arrived there.

The annual mink harvest averaged 310 animals, ranging from about 175 to 450 per year (Figure 28). Minnesota, Wisconsin, and Illinois report that mink populations are stable in areas with adequate wetland resources.

Vegetation

A diversity of plant communities occurs on the Refuge, located in aquatic to upland bluff terrains. These communities have been classified for management and research purposes specific to the Mississippi River by the U.S. Geological Survey's Upper Midwest Environmental Sciences Center (UMESC) (web site is www.umesc.usgs.gov) and the U.S. Army Corps of Engineers, Habitat Needs Assessment program (USACE, 2000). The Refuge uses these mapping sources on a daily basis for developing Geographic Information System management and habitat maps.

On a national level, the Federal Geographic Data Committee has established the National Vegetation and Information Standard (NVCS) to produce uniform statistics in vegetation resources from data collected nation-wide. These three classification systems have three distinct descriptors of vegetation types which have been cross-referenced ("cross-walked') by the Upper Midwest Environmental Sciences Center (Appendix O in the Final EIS/CCP). An example of the NVCS maps for the Refuge (Pool 8) appears in Appendix O as well. Land cover maps, based on UMESC interpretation and digitization of 2000 photography, for the entire Refuge are available at Refuge headquarters.

Submerged Aquatic Vegetation

Submerged aquatic vegetation includes plants that grow below the surface of the water and are usually anchored to the bottom by their roots. Examples are wild celery, water milfoil, and sago pondweed (see the plant list in Appendix K in the Final EIS/CCP). This group of plants generate dissolved oxygen, filter suspended material, stabilize bottom sediments, and cycle nutrients (Rogers and Theiling, 1999). Submerged aquatics provide crucial fish habitat, provide substrate for invertebrate growth, and are important foods for mammals and migratory birds. They are most often found in backwater areas of low water velocity, adequate light penetration and relatively stable water levels.

Prior to locks and dams most species that are now present occurred in localized wetland pockets and channel border areas, but their group was not a major component of the floodplain vegetation community (Green, 1970). Many aquatic areas dried up by the end of the summer growing season. At that time, floodplain forests dominated the river bottoms with hundreds of lakes and ponds scattered through the wooded areas. Wet meadows and hay fields were also present. After inundation, the stabilized water levels created shallow and deep water wetlands that supported an abundance of submerged plants. The response by wetland fish and wildlife was phenomenal in its diversity and abundance. In the 1940s, refuge biologist, Bill "Doc" Green noted that he could find "two dozen species of submergent plants in a matter of minutes anywhere in the better marshes and aquatic beds." Backwater sport fish (bluegill, bass, and crappies) and diving ducks (Canvasbacks, Scaup, and Ring-necked Ducks) utilize submerged plants extensively.

Beginning in the 1960s and 1970s, river scientists and users noted declines in submerged (and emergent) vegetation cover throughout the Refuge. Factors included wind and wave action, poor light penetration due to highly turbid water conditions, sedimentation and filling of backwaters, major flooding events, and long term inundation with few drying periods.

Due to these factors, there is an uneven distribution of submerged plants through the length of the Refuge. Recovery of lost submerged plant beds has occurred naturally or through habitat rehabilitation projects in Pools 4, 5A, 7, 8, 9, and 13. More work is necessary in other Refuge pools to gain a more even distribution of aquatic plant growth and associated fish and wildlife use.

Emergent Aquatic Vegetation

Emergent aquatic vegetation (emergents) are plants whose roots are anchored under water with much of the plant extending above the water surface. They include cattail, river bulrush, giant reed grass, burreed, arrowheads and wild rice. They are backwater plants adapted to low water velocities and shallow- to deep-water marsh conditions.

Prior to the lock and dams, river bulrush was the most abundant marsh species and continues to be prominent today. Cattail was uncommon, as it is today on the floodplain. Burreed was common before inundation, became abundant soon after, but has since declined. The arrowheads were present

before, but after became widespread and abundant, until suffering declines since the 1970s. The arrowheads (rigid and duck potato) are important waterfowl and muskrat foods.

The lack of emergent vegetation on the Refuge is a key concern in management and restoration of puddle duck and tundra swan migration habitat. Studies of available kilocalories (bioenergetics) for waterfowl reveal that deep marsh perennial emergent vegetation (particularly arrowhead tubers), provides some of the highest valued resources on the Refuge (Kenow et al., 2003).

Floodplain Forest

Floodplain forests are important to the biological integrity of the Upper Mississippi River System (UMRCC, 2002). They provide rich habitat for wildlife (and fish during high-water events), reduce soil erosion, improve water quality and provide a scenic and recreational landscape. Among vegetation communities of the Upper Mississippi River, the highest number of birds species observed during spring migration in 1995 and 1996 were found in floodplain forest habitat (Yin, 1999).

Floodplain forests are declining in the Upper Mississippi River System and the Refuge due to agricultural and urban developments, changes in natural riverine flood pulses, the rising water table, and island loss due to wind and wave action. The forests that remain are changing in composition from a diversity of species, including mast producing trees, to a more monotypic forest dominated by silver maple and herbaceous openings. In some pools, many forest stands are even aged mature trees with little or no understory or seedling regeneration (UMRCC, 2002).

River mangers and biologists have identified what an "ideal" floodplain forest would look like (UMRCC, 2002). Basically, it would contain a diversity of tree species to include existing silver maple and potential codominant species such as eastern cottonwood, elm, green ash and river birch. The forest would also contain mast producing species such as oak, pecan and hickory whose seeds are food sources for Wood Ducks, squirrels, deer and Blue Jays. Diversity would also be evident in size and age, with older mature woods available for nesting eagles and herons.

The driving forces of forest change or succession in the floodplain environment is ecological disturbance, such as flooding, tornados, severe winds, disease, pests, and occasional fire. The great flood of 1993 caused relatively minor tree mortality above Pool 13, but below that pool mortality escalated sharply. Mortality rates were positively correlated with flood duration and negatively correlated with the diameter of the trees (Yin et al., 1994).

Recommended forest management practices would replicate these natural processes (UMRCC, 2002). These practices include: forest regeneration, shelterwood harvest methods, seed tree methods, group selection methods, tree planting, the use of herbicides, water level management, and potential modification of site elevation (increase) to promote growth. Invasive species (particularly reed canary grass) present problems in forest regeneration within the upper pools of the Refuge. Research and experimental cuts will need to be conducted to achieve successful regeneration in these areas.

Reforestation projects may include increasing land elevations to avoid impacts of flooding. Those impacts may also be avoided by selecting appropriate tree species and locating tree plantings in areas less prone to flooding. Foresters have a tool to determine predicted flood potential throughout the pools in models available at the Upper Midwest Environmental Science Center's web site (Wlosinski and Wlosinski, 2001).

The Refuge is cooperating with Corps of Engineers foresters in completing a forest inventory of both the Corps-acquired land and U.S. Fish and Wildlife Service-acquired lands in the St. Paul and Rock Island Corps Districts. This is crucial to establishing objectives and meeting management goals in the Refuge's future forest management plan.

Grasslands

Grassland and prairie habitats are generally uncommon in the floodplain, but there are several units that occur on islands or sand terraces adjacent to the floodplain. There are two prominent prairie systems within the Refuge adjoining Pool 13. One is the newly acquired Lost Mound Unit (the former U.S. Army Savanna Depot) that protects a seven-mile long sand dune along the river's edge and contains approximately 4,000 acres of sand prairie and oak-ash savanna associations. There are 488 buildings, left over from the Depot operations, scattered throughout the unit. The Refuge's Thomson Prairie protects similar habitat 25 miles down river of Lost Mound. These units contain some of the last remaining habitats of their kind in the state of Illinois. Habitat management of these areas includes burn-

ing, limited grazing, and mechanical, biological and chemical treatments.

There are 39 other grassland units (ranging in size from 1.4 to 125 acres) distributed throughout the Refuge for which fire prescriptions have been developed. These units are managed primarily for migratory bird nesting cover, moist soil feeding sites, and to enhance biological diversity. Grassland habitats support state-listed plant and animal species of concern, such as crucial nesting habitat for the Blanding's turtle.

Natural and Current Role of Fire

The following discussion is from the Refuge Fire Plan, approved in 2002.

There is no recorded history of fire on the Refuge prior to its establishment in 1924. Our best estimate is that fire played a minor role within the river valley. That is not to say wildfires did not occur on lands now managed as part of the Refuge, as the river was certainly heavily used by Native Americans and fire surely occurred in the historic meadows and grasslands that were once part of the original river valley. However, since the placement of the locks and dams the areas that would have been influenced by fire are now mostly under water.

As wildfires have been limited in scope on the Refuge there is little documentation as to their impact on the areas burned with regard to the vegetation, wildlife and/or soils.

Prescribed fire has been mostly confined to the prairie areas of the Refuge for the purpose of restoring and/or maintaining the diverse native plant community. This is very important in areas which have remnant native prairie vegetation. To date fire has been used successfully to maintain the native plant species on these areas.

Fire has had no negative impact on threatened and/or endangered species on the Refuge.

Wild Fires and Prescribed Burns

Between 1989 and 2000, there were 29 reported wildfires on the Refuge. Of those, 23 were 10 acres or less in size and of these 14 burned 1 acre or less. Eighteen wildfires occurred in the March-May period and 4 in October. The remaining fires were scattered throughout the rest of the year with only January, August and September wildfire free. The main causes of wildfires were arson or escaped campfires. It should be noted that arson fires have accounted for all fires over 10 acres in size except for one escaped campfire which burned 60 acres. In looking at the past fire data most wildfires are contained almost immediately upon attack.

A total of 80 prescribed burns were completed on the Refuge between 1991 and 2000, covering 1,592 total acres. The Savanna District had the most active burning program due to the abundance of native prairie and grasslands; see District summary below.

Winona District	19 burns 170 acres
La Crosse District	10 burns 103 acres
McGregor District	10 burns 295 acres (1996-2000)
Savanna District	41 burns 1,100 acres

Environmental Management Program.

The Upper Mississippi River System Environmental Management Program (EMP) was created due to controversies surrounding the replacement of Lock and Dam No. 26 near Alton, Illinois. The debate began in the 1970s when environmental groups and area railroads opposed the proposed construction of two 1,200-foot locks at the site. In 1978, Congress authorized construction of a new dam with one 1,200-foot lock and directed the Upper Mississippi River Basin Commission to study and make recommendations on further navigation capacity expansion and its ecological impacts.

The Commission completed the study and recommendations in 1982 and presented its findings in the *Comprehensive Master Plan for the Management of the Upper Mississippi River System*. Some of the Master Plan recommendations included a second

lock (600 feet) at Lock and Dam 26, a habitat rehabilitation and enhancement program, a long-term resource monitoring program, a computerized inventory and analysis system, recreation projects, and a study of the economic impacts of recreation. Section 1103 of the 1986 Water Resources Development Act (Public Law 99-662) declared that the Upper Mississippi River System is a "nationally significant ecosystem and a nationally significant navigation system." In addition, the act authorized the second lock at Lock and Dam 26 and several environmental initiatives on the Upper Mississippi River. The environmental initiatives became known as the Upper Mississippi River System Environmental Management Program. The 1990 Water Resources Development Act extended the original EMP authorization period for an additional 5 years, through fiscal year 2002. The 1999 Water Resources Development Act increased the annual authorization to $33 million and established two main elements as continuing authorities:

Planning, construction, and evaluation of fish and wildlife habitat rehabilitation and enhancement projects (HREPs).
Long term resource monitoring, computerized data inventory and analysis, and applied research (LTRMP).

The EMP is a coordinated habitat restoration program for the Upper Mississippi River system administered by the Corps of Engineers in partnership with several federal, state, and non-governmental agencies. Partners include the federal agencies of the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Geological Survey, and U.S. Environmental Protection Agency; the state natural resource agencies of Minnesota, Wisconsin, Iowa, Illinois, and Missouri; and non-governmental agencies. Through this coordinated, effective planning process based on sound science, a built-in evaluation process, and a strong partnership between the agencies, EMP has evolved into a premier river habitat restoration program.

Because the Refuge is located entirely within the Upper Mississippi River system, the Refuge is fully involved with planning, designing, constructing, evaluating, and operating and maintaining all EMP habitat rehabilitation and enhancement projects (HREPs) built on the Refuge. In addition, the Refuge is involved in the EMP Long Term Resource Monitoring Program (LTRMP).

The mission of the EMP LTRMP is to provide decision makers with the information needed to maintain the Upper Mississippi River System as a viable multiple-use large river ecosystem. LTRMP works to develop a better understanding of the Upper Mississippi River ecosystem and its problems; monitor and evaluate long term resource changes and trends; develop alternatives to better manage the river system; and to manage, organize, and distribute scientific information about the river (USACE, 2004b). Three (3) pools within the Refuge are monitored closely by the LTRMP: 4, 8, and 13. The Refuge and LTRMP exchange data and the Refuge has assisted with data collection.

The purpose of building HREPs on the Upper Mississippi River is to counteract the effects of an aging impounded river system by changing the river's floodplain structure and hydrology. This can involve altering sediment transport and disposition, water levels, connectivity between the river and its floodplain, and constructing structures in the floodplain.

This program has made it possible to improve tens of thousands of acres along the Upper Mississippi River system. Since the program began in 1987, 40 completed HREPs have affected over 72,000 acres of habitat. In addition, 24 projects which could affect over 70,000 acres are in the construction, design, or planning phases (Figure 29). Directly on or adjacent to the Refuge itself, there are 27 completed HREPs affecting over 43,000 acres of habitat, and the Refuge is solely responsible for operating and maintaining 25 of those projects (Table 9). The Refuge is currently involved in the planning, design and construction of 10 HREPs which will affect an additional 30,800 acres of habitat. When these 10 projects are completed, the 37 HREPs on or next to the Refuge will improve approximately 73,800 acres of habitat. Eventually, more projects will be added to the program through the selection process.

Potential HREPs on the Refuge are identified, prioritized, and selected by a partnership which includes the Corps of Engineers, U.S. Fish and Wildlife Service, and the four states of Minnesota, Wisconsin, Iowa, and Illinois. Once the projects are identified, the partners, along with the interested public, prioritize, select and plan each project. Considerations for prioritization, selection, and planning to meet overall program and individual project goals include ecological merits, Environmental Pool Plans, sequencing, geographic distribution, and available funds. In addition, the partners use the

Figure 29: Upper Mississippi River System Environmental Management Program Habitat Rehabilitation and Enhancement Projects[1]

1. *Site Nos. 3 through 37 are on or adjacent to the Upper Mississippi River Refuge (USACE, 2004b).*

Habitat Needs Assessment, developed under EMP, as a tool for project identification and planning.

Refuge and other Service personnel are completely involved with the entire HREP process including identifying, prioritizing, selecting, planning, designing, constructing, and evaluating all projects on the Refuge. The Refuge is also responsible for operating and maintaining all HREPs constructed on the Refuge. The Refuge employs an EMP Coordinator to oversee Refuge involvement in HREPs, to serve as a liaison between the Refuge and the other partners, and to ensure that projects are designed and built to serve their intended function with reasonable operation and maintenance costs. In addition, Refuge and other Fish and Wildlife Service personnel are involved with other interagency planning teams where EMP projects are identified, prioritized and selected such as the Fish and Wildlife Interagency Committee, Fish and Wildlife Work Group, River Resources Forum, River Resources Coordination Team, and the EMP Coordinating Committee.

To meet the habitat objectives of each project, several techniques are used, usually in combination: backwater dredging, water level management, island creation, shoreline stabilization, secondary channel modification, and aeration (USACE, 2004b). Table 10 describes the purposes of these techniques.

The Pool 8 Phase II HREP is an example of a project which combined several techniques to dramatically improve the habitat in Stoddard Bay, near Stoddard, Wisconsin. This project incorporated

Table 9: Summary of Environmental Management Program Habitat Rehabilitation and Enhancement Projects On or Adjacent to the Upper Mississippi River Refuge (Adapted from USACE, 2004b)

Environmental Management Program												
Pool	Project Name	Cost	Project Status[1]	Year Completed	Affected Acres	Project Features/Techniques						
						Back-water Dredging	Water Level Mgmt.	Island	Bank Stabilization	Side Channel Restoration	Aeration	Other
	Bank Stabilization, Pools 6, 9 & 10	$1,697,000	F	1999	1,500				X			
4	Indian Slough	$988,000	F	1994	631	X				X		X
	Peterson Lake	$1,179,000	F	1996	500			X	X	X		
5	Island 42	$262,000	F	1987	95	X				X	X	
	Finger Lakes	$1,445,000	F	1994	113						X	X
	Spring Lake Penninsula (Pool 5)	$448,000	F	1995	300	X		X	X	X		
	Small Scale Drawdown	$97,000	F	1997	52		X					X
	Spring Lake Islands (Pool 5)	$2,930,000	C	N/A	500	X		X	X	X	X	X
5A	Polander Lake	$3,000,000	F	2002	1,000	X		X	X			
6	Trempealeau[2]	$5,723,000	F	1999	5,620		X		X			
7	Lake Onalaska	$2,064,000	F	1989	7,000	X		X	X		X	
	Long Lake	$1,037,000	F	2002	15				X		X	
8	Pool 8 Islands, Phase I	$2,314,000	F	1993	1,000	X		X	X			
	East Channel	$558,000	F	1997	19				X			
	Pool 8 Islands, Phase II	$3,482,000	F	1999	500	X		X	X			X
	Pool 8 Islands, Phase III	$15,120,000	D	N/A	3,000	X		X	X	X		X

Table 9: Summary of Environmental Management Program Habitat Rehabilitation and Enhancement Projects On or Adjacent to the Upper Mississippi River Refuge (Adapted from USACE, 2004b) (Continued)

Environmental Management Program												
Pool	Project Name	Cost	Project Status[1]	Year Completed	Affected Acres	Project Features/Techniques						
						Back-water Dredging	Water Level Mgmt.	Island	Bank Stabilization	Side Channel Restoration	Aeration	Other
9	Pool Slough[3]	$715,000	C	N/A	52		X					
	Blackhawk Park[4]	$309,000	F	1990	282		X			X	X	
	Lansing Big Lake	$2,089,000	F	1994	9,755				X	X		X
	Conway Lake	$2,460,000	P	N/A	560	X	X	X	X	X	X	X
	Lake Winneshiek	$4,560,000	P	N/A	6,000	X		X	X	X		X
	Capoli Slough	$1,995,000	P	N/A	600	X		X	X	X		X
	Pool 9 Islands	$1,266,000	F	1995	320			X				
	Cold Springs	$463,000	F	1994	35	X					X	
	Harpers Slough	$9,000,000	P	N/A	2,200	X		X	X	X		
10	Ambrough Slough[4]	$2,142,000	F	2004	2,500	X		X		X	X	X
	Bussey Lake	$3,594,000	F	1995	213	X	X	X			X	
11	Guttenberg Ponds	$327,000	F	1989	35	X	X					
	Bertom McCartney Lakes	$2,244,000	F	1992	2,000	X		X	X	X		X
	Pool 11 Islands	$8,559,000	C	N/A	10,342	X		X	X	X	X	X
12	Pool 12 Overwintering	$2,500,000	P	N/A	6,900	X						X
13	Pleasant Creek	$1,404,000	F	2003	2,350	X						
	Brown's Lake	$1,993,000	F	1990	453	X					X	X
	Smith Creek	$850,000	P	N/A	650							X
	Spring Lake (Pool 13)	$6,646,000	F	2002	3,300		X					
	Potters Marsh	$2,975,000	F	1995	2,305	X	X					X

Table 9: Summary of Environmental Management Program Habitat Rehabilitation and Enhancement Projects On or Adjacent to the Upper Mississippi River Refuge (Adapted from USACE, 2004b) (Continued)

Environmental Management Program												
Pool	**Project Name**	**Cost**	**Project Status[1]**	**Year Completed**	**Affected Acres**	**Project Features/Techniques**						
						Back-water Dredging	Water Level Mgmt.	Island	Bank Stabilization	Side Channel Restoration	Aeration	Other
14	Princeton Refuge[3]	$3,983,000	F	1999	1,129		X					X
	Completed (27 projects)	$53,729,000			43,022							
	Under Construction (3 projects)	$12,204,000			10,894							
	Design (2 projects)	$15,120,000			3,000							
	Planning (6 projects)	$21,365,000			16,910							
	Totals (37 Projects)	$102,418,000			73,826							

1. *Project status as of January 2004. F = Finished; C = Under Construction; D = Design; P = Planning and preliminary design.*
2. *Project located on Trempealeau NWR adjacent to the Upper Mississippi River Refuge. Trempealeau NWR is responsible for operation and maintenance.*
3. *Project located adjacent to the Refuge. Iowa Department of Natural Resources is responsible for all or a portion of the operation and maintenance.*
4. *Project located adjacent to the Refuge. Wisconsin Department of Natural Resources is responsible for all or a portion of the operation and maintenance.*

Table 10: Upper Mississippi River System Environmental Management Program Habitat Rehabilitation and Enhancement Project Techniques. (USACE, 2004b)

Technique	Objectives
Dredge backwaters	Alter flow patterns and velocity Improve floodplain structural diversity Increase deep water fish habitat Provide access for fish movement Provide dredged material to support revegetation
Manage water levels using dikes and water control systems	Restore natural hydrologic cycles Promote growth of aquatic plants as food for waterfowl Reduce backwater sediment loads Consolidate bottom sediments Control rough fish
Build islands	Decrease wind and wave action Alter flow patterns and sediment transport Improve aquatic plant growth Improve floodplain structural diversity Provide nesting and loafing habitat for waterfowl and turtles
Stabilize shorelines	Prevent shoreline erosion Maintain floodplain structural diversity Create fish habitat Reduce sediment loads to backwaters
Modify secondary channels	Improve fish habitat and water quality by altering inflows Stabilize eroding channel Reduce sediment load to backwaters by reducing flow velocities Maintain water temperature and provide rock substrate
Aerate	Improve fish habitat and water quality by introducing water
Miscellaneous Experimental and Complementary Techniques:	
Large scale water level management	Seed islands
Upland sediment control	Isolated wetlands
Land acquisition	Weirs
Riffle pools	Rock sills
Potholes	Sediment traps
Notched wing dams	Mussel substrates
Anchor tree clumps	Bottomland Forest Restoration
Vegetative plantings	

backwater dredging, island construction, and bank stabilization techniques to improve 500 acres of habitat (Figure 30). Wisconsin Department of Natural Resources monitoring of the area documented immediate vegetative response and among the highest abundance of bluegills in Pool 8 after the project was completed (USACE, 2004b). Duck and swan use in the area also increased significantly from the early 1990s pre-project conditions.

HREP design has evolved appreciably since the program began in 1986. As projects are completed and evaluated, design has improved and innovative new techniques have developed. Some examples:

Island design has evolved from just being a wind and wave barrier to incorporating areas for specific habitat such as humps for turtles, mudflats for waterbirds, and dynamic shorelines for shorebirds. Islands are also designed with varied elevations above the average water level to provide additional vegetation habitat diversity.

Island design has also evolved into providing more natural-looking layouts and features. Islands are now designed to replicate historical islands that have eroded away since the river was impounded. Use of rock for shoreline stability has decreased with the use of native vegetation such as willow plantings. Sacrificial berms with rock groins allow the river to shape and stabilize the islands which provides for a dynamic, more natural-looking shoreline (Figure 31).

Figure 30: Phase II Habitat Rehabilitation and Enhancement Project, Stoddard Islands, Upper Mississippi River Refuge, Aerial Photo Sequence (Wisconsin Department of Natural Resources)

Figure 31: Constructed Islands with Sacrificial Berms, Rock Groins, and Native Vegetation, Upper Mississippi River Refuge

Figure 32: Seed Islands Constructed and "Growing" on Upper Mississippi River Refuge

Seed islands are a new concept that developed as a direct result of the HREP program. Seed islands are designed for areas of flowing water where sediment transport is occurring. With the river's natural process, the sediment will deposit on these obstructions and form low islands which will protect areas from wave action and provide additional habitat diversity within the floodplain (Figure 32).

HREPs now include designs for experimental features such as rock/log structures for offshore island protection which provide more diverse habitat than using only rock. Another experimental feature, wildlife loafing structures, consists of tree clumps extended into the river and anchored into island shorelines to provide loafing habitat for turtles and birds and to provide fish habitat (Figure 33).

Water Level Management

The purpose of water level management is to partially re-create the natural river hydrology that occurred before the locks and dams were constructed (refer to Section on page 41). The entire 261-mile length of the Refuge is impounded by the locks and dams, from Pool 4 through Pool 14. Temporarily lowering water levels behind dams during the summer months can stimulate the growth of aquatic plant beds in the lower portion of the pools. This process is called a drawdown.

Since the early 1990s the Service, Corps of Engineers, U.S. Geological Survey, state natural resource agencies, navigation industry, and the public have been working together to perform drawdowns at various pools throughout the Upper Mississippi River. Refuge and other U.S. Fish and Wildlife Service personnel are completely involved with water level management and belong to two

Figure 33: Wildlife Loafing Structures Placed on Constructed Islands Upper Mississippi River Refuge

field-level multi-agency committees which work to recommend water level management practices in their respective navigation pools:

Pools 1-10: Water Level Management Task Force, subcommittee of the River Resources Forum.

Pools 11-22: Water Level Management Subcommittee, subcommittee of the Fish and Wildlife Interagency Committee of the River Resources Coordinating Team.

The Corps of Engineers operates the dams to provide a 9-foot channel for commercial navigation. (The dams do not provide flood control as many people believe.) Each dam has a specific operating plan and is regulated on the basis of discharge (i.e. flow) and maintaining certain water levels at its control point. During times of low flow, gates are lowered into the water backing up the river to maintain the 9-foot channel. As the flow increases, gates are raised allowing more water to pass through the dam while minimizing flooding on adjacent property. When the flow is great enough to provide a 9-foot channel without dams, gates are raised completely out of the water, resulting in the "open river" condition.

To perform a drawdown, water levels are temporarily reduced by half a foot to several feet behind specific dams during the summer months, mimicking natural water level fluctuations. The drawdown to the lower water level is performed gradually, usually over a two week period, in order to allow fish, mussels, and other wildlife to move and adjust to the water level rather than become stranded in an isolated area. The water level is held at the lowered level until the desired performance period is complete or discharges through the dam become too high or low to maintain the lowered level. Once the

Table 11: Upper Mississippi River Pools on Refuge Most Suited for a Drawdown (Adapted from USACE, 2004c), Upper Mississippi River Refuge

Pool	Drawdown[1] Magnitude (ft)	Drawdown Success Rate	Acres Exposed	Dredging Required (yd^3)	Dredging Cost	Cost per Acre
5	1	95%	1,100	135,811	$643,175	$585
	2	81%	2,200	287,236	$1,365,093	$620
	3	55%	4,000	448,088	$2,137,217	$534
	4	38%	5,500	610,333	$2,935,132	$534
7	1	98%	1,206	0	$0	$0
	2	74%	2,331	215,000	$1,280,000	$549
	3	40%	3,385	475,000	$2,800,000	$827
8	1	74%	1,300	2,000	$88,000	$68
	2	50%	3,090	120,253	$475,000	$154
	3	33%	5,215	300,000	$1,185,000	$227
9	1	71%	4,751	0	$0	$0
	2	57%	6,932	75,000	$375,000	$54
	3	40%	9,497	165,000	$825,000	$87
11	1	91%	399	0	$0	$0
	2	86%	883	49,368	$399,400	$452
	3	86%	1,606	109,076	$762,441	$475
	4	64%	2,744	162,800	$976,800	$356
13	1	86%	1,560	35,200	$316,800	$203
	2	86%	2,822	131,032	$1,021,093	$362
	3	68%	4,519	229,768	$1,581,487	$350
	4	55%	6,821	325,600	$1,953,600	$286

[1] *"Drawdown" refers to a reduction in the target operating level for the navigation pool, as measured at the dam.*

drawdown period is complete, the water level is gradually brought up to its normal level.

There are many factors that limit the use of drawdowns in specific river stretches. These include the amount of acres which can be economically exposed, how much dredging is required to maintain commercial navigation and recreational access to the river, affects to industry barge staging areas, locations of water intake pipes for industry or municipalities, and exposure of archeological sites. Drawdowns can only be performed under specific discharge ranges developed for each dam. Some dams have very narrow drawdown discharge ranges which makes them poor candidates for drawdowns. Within the Refuge, the Corps of Engineers has determined that pools 5, 7, 8, 9, 11, and 13 are best suited for drawdowns based on discharge conditions (USACE, 2004c) (Table 11).

Timing of the drawdown period is also important. The main purpose of a drawdown is to stimulate aquatic vegetation growth; therefore most drawdowns begin in mid-June and end in August or September. However other concerns are considered in the timing such as disturbance to nesting birds, disruption of fish spawning, exposure of mussel populations, and stranding of fish. Many of these concerns are mitigated by the gradual lowering and raising of the water levels.

To determine how successful a drawdown is, data such as land cover, vegetation surveys, and bathymetry is gathered prior to the drawdown. During a drawdown, the effects are carefully monitored; aerial photos are taken and vegetation surveys conducted to determine how much influence the drawdown had. In addition, the effects are monitored for several years after selected drawdowns to see how

Figure 34: Pool 8 Drawdown Sequence (Upper Mississippi River Refuge, La Crosse District)

long the effects last. This information will help river managers determine when the next drawdown of that pool should occur to maximize the effects for that river reach.

Drawdowns have been successfully performed in several areas of the Upper Mississippi River. The U.S. Army Corps of Engineers, St. Louis District has been performing annual drawdowns of Pools 24, 25 and 26 (Melvin Price) since 1995 creating thousands of acres of critical vegetation in those pools. In the late 1990s, small, isolated drawdowns were performed successfully on the Refuge in Pools 5 and 9, demonstrating improved vegetation growth through a drawdown.

In Pool 8, large-scale drawdowns, 18-inches at the dam, were successfully performed in 2001 and 2002. More than 1,950 acres of river bottom were exposed, growth of perennial emergent vegetation was robust (Figure 34), and arrowhead tuber production increased 16-fold in selected areas (RRF, 2004a).

In 2005, a 1.5-foot drawdown of Pool 5 was performed that exposed over 1,000 acres of mudflats and sand bars. Initial results indicate that 72 species of plants were detected in the drawdown area. The resource agencies are evaluating monitoring results for drawdown effects to plant response, waterbirds, mussels, recreation, transit time for commercial navigation, water quality, sediment movement and budget, and sediment nitrogen cycling (RRF, 2005). A second year Pool 5 drawdown, maximum of 1.5 feet, is planned for the summer of 2006.

Drawdowns of Pool 13 have been attempted three times but were discontinued due to low flows. Planning for Pool 13 continues and planning for drawdowns of Pools 6, 8, and 9 is under way.

Drawdowns have proven to be a cost effective way to restore habitat in large reaches of the river. The resulting increased vegetation provides valuable food and cover for fish, migrating waterfowl, and other species along the river. In addition, the

Table 12: Estimated Annual Hunting Visits to the Upper Mississippi River Refuge (Fiscal Years 1999-2003 Refuge Management Information System Reports)

Hunting	Estimated Total Number of Hunter Visits per Fiscal Year				
	1999	2000	2001	2002	2003
Waterfowl	160,936	176,313	189,453	339,430[1]	248,640
Other Migratory Birds	1,645	3,386	4,000	4,591	4,899
Upland Game	19,414	11,872	10,542	10,046	10,084
Big Game	35,921	23,470	23,812	22,371	21,080
Total	217,916	215,041	227,807	376,438	284,703

1. This number is probably too high and reflects a reporting anomaly.

vegetation can absorb nutrients from upland runoff, helping reduce excess nitrogen and phosphorus input into the Mississippi River system. This could in turn contribute to the reduction of Gulf hypoxia.

General Public Use

Hunting

Hunting, one of the priority public uses of the Refuge System, has a deep history and tradition on the Refuge where several species of upland game, big game, and migratory waterfowl and birds are hunted. In fiscal year 2003, over 284,000 hunter visits were made to the Refuge, and approximately 87 percent of those visits were for waterfowl hunting (Table 12). Between 1999 and 2003, waterfowl hunting accounted for 74 to 90 percent of the estimated hunter visits. Portions of the Refuge are open to hunting in accordance with federal, state, and local regulations. Four states overlap with the Refuge, each with their own hunting regulations and seasons (Table 13), requiring hunters to be aware of which state they are hunting in on the Refuge.

Two managed hunts, Potter's Marsh and Blanding Landing, are conducted on the Refuge (Table 5, Appendix C). Since 1980, the Savanna District has conducted a lottery drawing for waterfowl hunting blind sites on 1,923 acres of Potter's Marsh in Pool 13. Applicants pay a $10 non-refundable application fee, and successful applicants pay an additional $100 fee for the 49 blind sites. Successful applicants construct blinds for the season according to guidelines provided. Over 500 persons apply for a blind permit annually. In 2002, hunter bag checks showed that hunters using Potter's Marsh blinds averaged 3.8 birds/day compared to 2.9 birds/day on other areas in Pool 13.

The other managed hunt for waterfowl hunting, Blanding Landing, is a 412-acre area within the former Savanna Army Depot that is now part of the Lost Mound Unit of the Refuge. The Illinois Department of Natural Resources conducts a managed hunt on the area.

Closed Areas

The Refuge currently includes 14 closed areas and one sanctuary encompassing 44,544 acres. The closed areas do not prohibit entry, but are closed to hunting and furbearer trapping during the duck hunting season and to migratory bird hunting at all times. The sanctuary, the Spring Lake Closed Area (Pool 13), is closed to all public entry from October 1 to the end of the duck hunting season. For background information on the closed areas, refer to Appendix Q in the Final EIS/CCP.

In recent years, eight administrative "No Hunting Zones" totaling nearly 3,555 acres were established (6 on Pool 13 and 1 on Pool 7) for public safety, to reduce potential user group conflicts, and provide opportunities for wildlife observation. This includes part of the former Savanna Army Depot that is now part of the Lost Mound Unit. Due to contamination, 2,467 acres of the Lost Mound Unit Crooked Slough Backwater are closed to entry. These "No Hunting Zones" are not intended to augment the Refuge's waterfowl closed area system. (see maps in Appendix E, and Table 2 in Appendix C.)

Fishing

Fishing, another priority public use of the Refuge System, remains an important, traditional use of the Refuge. In fiscal year 2004, over 1 million visitors fished either from boat, shore or on the ice (Table 14). Fishing occurs year-round, with the possible exception of spring ice break-up. The most

Table 13: Comparison of Hunting Seasons 2003 - 2004 on Upper Mississippi River Refuge For Minnesota, Wisconsin, Iowa, Illinois

Event	Dates	Minnesota		Wisconsin		Iowa		Illinois	
Deer Hunting									
Gun Season	Start	22-Nov-03		22-Nov-03		6-Dec-03	13-Dec-03	21-Nov-03	4-Dec-03
	End	30-Nov-03		30-Nov-03		10-Dec-03	21-Dec-03	23-Nov-03	7-Dec-03
	# of Days	9		9		5	9	3	4
Special Management Zones	Start			30-Oct-03	11-Dec-03				
	End			2-Nov-03	14-Dec-03				
	# of Days			4	4				
Wild Turkey Hunting									
Fall Season	Start	15-Oct-03	22-Oct-03	11-Oct-03		13-Oct-03		25-Oct-03	
	End	19-Oct-03	26-Oct-03	9-Nov-03		5-Dec-03		2-Nov-03	
	# of Days	5	5	30		54		9	
Spring Season	Start	14-Apr-04	(Separated into 8 5-day seasons)	14-Apr-04	(Separated into 6 5-day seasons)	12-Apr-04	(Separated into 4 various length seasons)	12-Apr-04	(Separated into 5 various length seasons)
	End	27-May-04		23-May-04		16-May-04		13-May-04	
	# of Days	44		40		35		32	
Migratory Game Bird Hunting									
Dove	Start	1-Sep		1-Sep-03		N/A		1-Sep-03	1-Nov-03
	End	30-Oct		30-Oct-03				14-Oct-03	16-Nov-03
	# of Days	60		60				44	16
Sora and Virginia Rails	Start	1-Sep-03		4-Oct-03	18-Oct-03	6-Sep-03		6-Sep-03	
	End	4-Nov-03		12-Oct-03	7-Dec-03	14-Nov-03		14-Nov-03	
	# of Days	65		9	51	70		70	
Common Snipe	Start	1-Sep-03		4-Oct-03	18-Oct-03	6-Sep-03		6-Sep-03	
	End	4-Nov-03		12-Oct-03	7-Dec-03	30-Nov-03		21-Dec-03	
	# of Days	65		9	51	86		107	
Woodcock	Start	20-Sep-03		20-Sep-03		4-Oct-03		18-Oct-03	
	End	3-Nov-03		3-Nov-03		17-Nov-03		1-Dec-03	
	# of Days	45		45		45		45	
Waterfowl Hunting									
Ducks	Start	27-Sep-03		4-Oct-03	18-Oct-03	20-Sep-03	11-Oct-03	16-Oct-03	
	End	25-Nov-03		12-Oct-03	7-Dec-03	24-Sep-03	4-Dec-03	14-Dec-03	
	# of Days	60		9	51	5	55	60	

Table 13: Comparison of Hunting Seasons 2003 - 2004 on Upper Mississippi River Refuge For Minnesota, Wisconsin, Iowa, Illinois (Continued)

Event	Dates	Minnesota		Wisconsin		Iowa		Illinois	
Canvas-backs	Start	11-Oct-03		18-Oct-03		18-Oct-03		16-Oct-03	
	End	9-Nov-03		16-Nov-03		16-Nov-03		14-Nov-03	
	# of Days	30		30		30		30	
Pintails	Start	27-Sep-03		4-Oct-03	18-Oct-03	20-Sep-03	11-Oct-03	16-Oct-03	
	End	26-Oct-03		12-Oct-03	7-Nov-03	24-Sep-03	4-Nov-03	14-Nov-03	
	# of Days	30		9	21	5	25	30	
Canada Geese	Start	27-Sep-03	12-Dec-03	4-Oct-03	18-Oct-03	27-Sep-03		1-Sep-03	16-Oct-03
	End	5-Dec-03	21-Dec-03	12-Oct-03	17-Dec-03	5-Dec-03		15-Sep-03	13-Jan-04
	# of Days	70	10	9	61	70		15	90
Furbearer Hunting									
Raccoon	Start	Continuous		18-Oct-03		1-Nov-03		5-Nov-03	
	End			31-Jan-04		31-Jan-04		10-Feb-04	
	# of Days	365		106		92		98	

Table 14: Estimated Annual Fishing Visits to the Upper Mississippi River National Wildlife and Fish Refuge (Fiscal year 1999-2004 Refuge Management Information System reports.)

	Estimated Total Number of Fishing Visits per Fiscal Year					
	1999	2000	2001	2002	2003	2004
Total	824,983	1,150,477	1,057,978	1,141,173	943,916	1,303,130

popular fishing spots are below the dams, near wing dams and spillway notches, and in backwaters. The Refuge provides many facilities to promote fishing including 26 boat ramps and 15 fishing piers and platforms (see maps in Appendix E and Tables 1 and 14 in Appendix H of the Final EIS/CCP).

According to a 2003 Minnesota Department of Natural Resources Mississippi River boating survey, half of all boaters indicated that their primary activity on the Mississippi River was fishing. In addition, 70 percent of boaters using public accesses indicated that fishing was their primary activity. This survey also concluded that the most common boat type on the Mississippi River in Pools 4-9 during the summer season is a fishing boat, followed by runabouts. A bass boat falls into the classification of a runabout because it has a windshield (MNDNR, 2004).

Fishing tournaments, particularly for bass and walleye, occur on the Refuge and are permitted by the states. Exact numbers of fishing tournaments are unknown since each state or other authority often has different permit and reporting requirements, or may not issue permits at all. In Illinois, only fishing tournaments initiating from an Illinois Department of Natural Resources launch site are required to have a permit. In Minnesota, permits are issued for tournaments with 30 participants or more. Permitted tournaments are limited to two weekends each month per pool. In Iowa, permits are issued to tournaments with 20 or more boats or 50 or more people. In addition, Iowa requires Illinois tournaments to have an Iowa permit if anglers are fishing in Iowa waters. Wisconsin issues permits for tournaments meeting a minimum participation threshold. Tournaments initiating from boat landings operated by the U.S. Army Corps of Engineers, Rock Island District are required to have

Table 15: Summary of Upper Mississippi River Fishing Tournaments by State

Year	Tournament Fish Species					No. of Tourn-aments	No. of Boats	No. of Anglers (Estimated)
	All	Walleye	Bass	Panfish	Catfish			
Minnesota (Pools 4-7)								
1996	4	9	2	0	0	15	1,072	21,44
1997	2	13	4	0	0	19	1,125	2,250
1998	4	13	4	0	0	21	981	1,962
1999	4	12	6	0	0	22	1,116	2,232
2000	5	12	3	0	0	20	1,430	2,860
2001	4	12	6	1	0	23	1,366	2,732
2002	2	13	4	0	0	19	1,363	2,726
2003	5	15	6	0	0	26	1,992	3,984
Totals for Minnesota						165	10,445	20,890
Iowa (Pools 9-14)								
1996	6	14	38	6	3	67	1,573	3,146
1997	10	19	37		4	70	2,583	5,167
1998	11	16	32	1	5	65	1,401	2,803
1999	8	10	44		3	65	1,433	2,867
2000	13	16	72	1	2	104	2,666	5,333
2001	15	22	104		2	143	2,682	5,364
2002	3	17	102	1	2	125	4,997	9,994
Totals for Iowa						639	17,335	34,674
Wisconsin (Pools 4-11)								
2002		20	77	2		99	922	1,620
2003		12	24			36	686	810
Totals for Wisconsin						135	1,608	2,430
Illinois (Pool 13)								
2003			14			14	155	330
Totals for Illinois						14	155	330

permits if they meet the minimum threshold of 15 boats. Table 15 summarizes fishing tournaments held on the Refuge.

There are few restrictions to lessen the biological impacts from tournaments. Some of the states are requiring catch and release in the same pool that the fish were caught, and in Iowa, during June, July and August immediate release of walleyes is required.

Wildlife Observation and Photography

Two of the six priority public uses for the Refuge System are wildlife observation and photography. The Refuge provides outstanding wildlife viewing opportunities due to the abundance of eagles, swans, ducks, warblers, pelicans, herons and other birds. The National Scenic Byways that border the Refuge for hundreds of miles and the relatively open access to lands and waters of the Refuge, make the Refuge one of the premier wildlife viewing and photography areas in the nation. The Refuge provides many facilities to support wildlife observation and photography including 15 observation decks, six hiking trails, three biking trails, four canoe trails, and one auto tour route (maps, Appendix E, and Table 3, Table 4, Table 5, Table 15 and Table 19 in Appendix H of the Final EIS/CCP). In fiscal year 2003, the Refuge recorded 220,000 wildlife observation and photography visits, and in fiscal year 2004, the visits increased to over 389,000 visits (Table 16).

Table 16: Estimated Annual Wildlife Observation and Photography Visits to the Upper Mississippi River Refuge (Fiscal year 2002-2004 Refuge Management Information System Reports)

Estimated Total Number of Wildlife Observation and Photography Visits per Fiscal Year		
2002	2003	2004
240,088	220,000	389,080

Interpretation and Environmental Education

For the Refuge System, interpretation and environmental education are two of the six priority public uses. Interpretive signs are the primary method of interpretation used by the Refuge. They are relatively inexpensive and convey messages at the visitor's convenience since they are available any time of the day or season. A total of 66 interpretive signs are used along the National Scenic Byways, bike trails, walking trails, overlooks and off-refuge sites overlooking the Refuge. In addition, 66 kiosks, 25 entrance signs and 30 official notice boards provide information about the Refuge. (See maps in Appendix E. Also, see and Table 16 in Appendix H of the Final EIS/CCP)

The Refuge has three full-time visitor services specialists, along with staff, volunteers and interns who conduct on- and off-site educational programs. The La Crosse and Savanna Districts have meeting rooms where educational activities are conducted. Lacking any classroom facilities, the McGregor and Winona Districts conduct all environmental education activities out on the Refuge or at off-site facilities.

Educational materials including books, posters, videos, equipment, and learning trunks are available for loan to area educators. In addition, Refuge staff, working with other agencies and organizations, coordinates special events including the Upper Mississippi River Festival, River Education Day, Birding Festivals, Eagle Days, and Refuge Week.

A yearly average of 6,000 students and teachers participate in on- and off-site environmental education activities. The number of students participating in on-site environmental education decreased 39 percent from 2000 to 2003 while off-site instruction increased 45 percent over the same period. This trend toward off-site instruction can be attributed to the lack of indoor and outdoor Refuge classroom facilities that accommodate students during inclement weather, as well as the lack of funding for school field trips. The Refuge has requested funding from the Friends Group to help defray bus transportation to Refuge sponsored activities such as the Upper Mississippi River Fest. .

Recreational Boating, Camping, and Other Beach-Related Uses

Although they are not wildlife-dependent priority uses of the Refuge System, an estimated 1.8 million visitors use the Refuge annually for recreational boating, camping, picnicking, swimming, social gatherings, and other beach-related uses. There is a long history of beach use on the Upper Mississippi River as the public took advantage of beach areas created by placement of dredged sand during navigation channel maintenance operations. The public also takes advantage of natural sand shorelines and sand placement sites often called "bathtubs".

For 10 years, extensive data from aerial photo surveys has been collected to evaluate the extent of watercraft use along a 150-mile section of the main navigational channel during the Memorial Day to Labor Day summer season (Resource Studies Center, St. Mary's University of Minnesota, 2001). This

U.S. Fish & Wildlife Service

study section starts at the lower end of Lake Pepin (Pool 4, River Mile 764.5) and ends at Guttenberg, Iowa (Pool 10, River Mile 614.2). Study data indicate that the highest percent of boating use occurs on Pools 10, 4 and 8. The areas that have the highest percentage of beached boats in the study area include:

Pool 4: Wabasha Bridge to Teepeeota Point
Pool 5: West Newton to Minneiska
Pool 5A: Bass Camp to Fountain City boat yard
Pool 8: Mouth of Root River to Deadman Slough Daymark
Pool 10: Wisconsin River confluence to Lock and Dam 10

Boating activity decreases where there are fewer beaches. In 2003, the Minnesota Department of Natural Resources conducted a recreational boating study on the Mississippi River, Pools 4-9, from Memorial Day through Labor Day (MNDNR, 2004). This study involved direct interviews and the use of questionnaires. It revealed that there were 670,345 boater-occasions (number of people in a boat using the river). While previous aerial photo surveys were limited to the main navigation channel, the Minnesota study attempted to locate all boats, regardless of their location on the river. A comparison of the 2003 Minnesota study to previous aerial photo counts shows the photos measure approximately 60 percent of all boating use. Therefore, it was estimated that 60 percent of recreational boating takes place in the main navigation channel, and 40 percent takes place in side channels and backwater areas. The 2003 Minnesota study also noted several boating trip characteristics:

The average boating party size is 2.9 people, most of whom are adults.
Overnight boating trips account for 12 percent of all trips.
Most boaters (87 percent) do not leave (lock out) the pool into which they launch.
One-third of all trips (32 percent) involve beaching.
Anglers spend most of their time in side channels and backwaters.
Fishing is the primary activity for half of all boaters.

The Refuge has designated four canoe trails and one electric motor area for recreational boaters engaged in "silent sport" activities such as kayaking and canoeing. In these areas, the public can at times experience the quiet and solitude of the Refuge backwaters (maps in Appendix E and Table 4 in Appendix C). Boats with motors are allowed in the canoe trail areas.

On several areas of the Refuge, boat traffic levels and size of boat wakes is leading to erosion of island and shoreline habitat. Some areas also present a safety hazard for boaters due to level of use and blind spots in the channel. To address these issues, there are 46 no-wake zones on the Refuge.

While not a wildlife-dependent use, camping is allowed on the Refuge. However, camping at any one site on the Refuge is restricted to no longer than 14 days during any 30-consecutive day period. In addition, tents, camping equipment, boats or other property cannot be left unattended at any site for over 24 hours. During waterfowl hunting seasons, camping is prohibited within Closed Areas, no hunting zones, or on any sites not clearly visible from the main navigation channel.

Public Use Facilities

The Refuge has four visitor contact stations, one each located at the La Crosse, McGregor and Savanna District Offices and one located at the Lost Mound Unit (Table 17). These contact stations feature small displays areas adjacent to the office area. The La Crosse and Savanna visitor contact stations also feature a sales area with natural history books and other products.

The Refuge maintains 26 boat landings with 700 parking spaces (maps Appendix E and Table 1 in Appendix C). The landings can accommodate flat bottom boats, v-bottom fishing boats, runabouts, powerboats, pontoon boats, canoes, and kayaks. An additional 221 non-U.S. Fish and Wildlife Service landings also provide access to the Refuge. There are numerous walk-in sites and roadside pull-off areas where access management and control is varied and inconsistent. Providing access to the Refuge is challenging given the rail and highway systems in place, and the physical restrictions of floodplain and terrain.

Scenic Byways

The Refuge winds through beautiful bluff country in Minnesota, Wisconsin, Iowa and Illinois. The Great River Road National Scenic Byways border the Refuge on both sides (Figure 35), providing access to many of the Refuge's visitor contact stations, boat ramps, trails, observation decks,

Table 17: Upper Mississippi River Refuge Visitor Contact Stations

District	Exhibits	Classroom	Book Store	Year Opened
La Crosse	Yes	Yes	Yes	1995
McGregor	Yes	No	No	1986
Savanna	Yes	Yes	Yes	2000
Savanna, Lost Mound Unit	Yes	No	No	1999

kiosks, and interpretive signs. The Great River Road includes the following highways near the Refuge:

Minnesota: U.S. Highway 61
Wisconsin: State Routes 35 and 133, County Road C, and U.S. Highway 61
Iowa: State Route 26, Iowa 340, U.S. Highway 52
Illinois: U.S. Highway 20, State Route 84

In addition to the Great River Road, the Lincoln Highway National Scenic Byway, US 30, intersects the Refuge at Fulton, Illinois. Refuge personnel work with state representatives of the scenic byways on projects that are beneficial to both the Refuge and the scenic byways.

Socioeconomic

The Upper Mississippi River Refuge comprises over 240,000 acres along the Mississippi River in the Upper Midwest. The Refuge covers 261 river miles beginning north of Wabasha, Minnesota, where the Chippewa River flows into the Mississippi River and ending just above Rock Island, Illinois. The Refuge has four management districts that encompass four states and 19 counties.

This section summarizes Dr. James Caudill's socio-economic information about the Refuge. For further documentation refer to his two reports, "Affected Environment: Socio-Economics" and "The Economic Effects of the Upper Mississippi River National Wildlife and Fish Refuge Baseline and Effects of Alternatives." Both documents can be found on the Refuge planning web site http://midwest.fws.gov/planning/uppermiss/index.html .

Population, Income, Employment and Demographics

For the Refuge area (19 counties) as a whole, the 2001 census population was over 933,000 which represented a 2.8 percent increase from 1991. This increase lagged behind population increases for the four states and for the U.S. Total employment in 2001 was over 589,000 for the Refuge area, representing a 12.7 increase from 1991. This increase, as with population, lagged behind state and U.S. employment increases. Per capita income (total area income [county, state or U.S.] divided by area population, and adjusted for inflation to 2003 dollars) was $25,514 for the Refuge area counties, increasing by 16.9 percent from 1991. While greater than the U.S. per capita increase, state increases in per capita income were greater than the Refuge area counties, ranging from a 24.4 percent increase for Minnesota to a 17.5 percent increase for Iowa.

While most of the counties are rural in nature, two of the districts have a fairly low level of farm-related employment. The Savanna District has only 4.2 percent of total employment in farming and the La Crosse District has only 6.0 percent of total employment in farming (Table 18). The other two districts, Winona and McGregor, show farm employment comprising 9.8 and 10.3 percent of total employment respectively. All four districts show a 10-year decline in farm-related employment, ranging from a 9.5 percent decline in the Savanna District to a 7.1 percent decline for both the Winona and McGregor districts.

Manufacturing, retail trade and services comprise the major employment sectors for all four districts. These three sectors comprise 59 percent of total employment for the Winona District, 61.5 percent for the La Crosse District, 59.3 percent for the McGregor District and 62.9 percent for the Savanna District. The fastest growing sectors for the Winona District are manufacturing (23.2 percent), services (21.4 percent) and retail trade (14.4 percent). In the La Crosse District, the fastest growing sectors include finance, insurance, and real estate (FIRE) (39.0 percent), services (34.0 percent) and wholesale trade (28.4 percent). For McGregor District, services was the fastest growing sector (32.5 percent), with retail trade sector (16.9 percent) and manufacturing (15.1 percent) following. In the Savanna Dis-

Figure 35: National Scenic Byways Bordering the Upper Mississippi River Refuge

Table 18: Employment Characteristics by Major Economic Sectors and Refuge District[1]

Sector	Winona District		La Crosse District		McGregor District		Savanna District	
	Percent change 1990-2000	Sector as percent of total employment 2000	Percent change 1990-2000	Sector as percent of total employment 2000	Percent change 1990-2000	Sector as percent of total employment 2000	Percent change 19902000	Sector as percent of total employment 2000
Farm	- 7.1	9.8	- 9.0	6.0	- 7.1	10.3	- 9.5	4.2
Nonfarm	24.4	90.2	22.6	94.0	20.0	89.7	14.8	95.8
Manufacturing	23.2	23.2	8.3	16.9	1.5	15.1	2.0	15.8
Wholesale	4.5	4.5	28.4	5.4	31.0	4.4	6.9	4.9
Retail	14.4	14.4	17.6	16.9	21.1	16.9	9.8	17.6
FIRE	3.5	3.5	39.0	5.1	26.7	5.0	11.1	5.7
Services	21.4	21.4	34.0	27.7	32.5	27.3	33.5	29.5
Government	11.8	11.8	14.3	12.4	- 2.3	10.1	- 4.2	11.3
Other	NA	21.3	NA	15.8	NA	21.4	NA	15.2

1. *Source: Caudill, 2004*

trict, the service sector had the highest increase, 33.5 percent, followed by FIRE (11.1 percent) and the retail trade sector (6.9 percent).

Caudill's "Affected Environment: Socio-Economics" (Caudill, 2004) report also details the demographics of the 19 counties in the Refuge area. The populations are more than 95 percent white. When compared to their respective states and the U.S. as a whole, the counties within the Refuge area have a:

- lower proportion of children under 5.
- higher proportion of people over 65.
- varying proportion of high school graduates from slightly lower to slightly higher.
- lower rate of college graduates.
- higher rate of home ownership.
- about the same rate of population below the poverty line.

Refuge Economics

Recreation visits to the Refuge and Refuge budget expenditures generate significant local and regional economic effects (Caudill, 2004a). In 2003, the Refuge accounted for over 3 million visitor days; boating, camping, and other beach-related uses accounted for 43 percent of total visitor days; fishing accounted for 38.3 percent; wildlife observation for 9.7 percent; migratory waterfowl hunting for 8 percent; big game hunting for 0.7 percent and small game hunting for 0.3 percent. These visits resulted in $73.5 million in retail expenditures in the nineteen-county area surrounding the Refuge. Total economic output associated with these expenditures amounted to $89.9 million (Table 19, Caudill, 2004a).

Recreational use of the Refuge generated 1,173 jobs in the 19-county area with job income of $19.7 million. Non-residents (living outside the 19-county area) spent $27.8 million in the local area resulting in $33.9 million in economic output and 431 jobs with labor income of $7.4 million. Recreational use of the Refuge generated over $9.6 million in federal, state and local taxes. The economic value of the recreational use of the Refuge is estimated to be between $46 million and $60 million annually.

Refuge budget expenditures average over $5 million annually. These expenditures generate $8.3 million in economic output, 93 jobs and over $1.7 million in job income. Over $731,000 in federal, state and local taxes are generated by Refuge budget expenditures.

Table 19: Total Economic Impacts of Recreational Use: Upper Mississippi River Refuge, 2003[1]

Activity	Expenditures	Output	Jobs	Job Income
Wildlife Observation	$4,063,292	$4,968,614	68	$1,071,484
Small game hunting	$160,431	$196,291	3	$42,497
Big game hunting	$501,106	$619,673	8	$142,627
Migratory bird hunting	$4,542,451	$5,609,297	76	$1,268,309
Fishing	$29,576,333	$36,223,053	483	$8,119,297
Boating	$34,673,216	$42,266,199	535	$9,044,582
Refuge Totals	$73,516,829	$89,883,127	1,173	$19,688,796

1.Source: Caudill, 2004a)

Considering both Refuge visitor and budget expenditures, the Refuge generates over $19 million annually in expenditures and economic value, $98 million in economic output, 1,266 jobs with an income of $21.4 million and federal, state and local taxes of $10.4 million. Each dollar of Refuge budget expenditures generates $23.90 of economic effects and $2.08 of federal, state and local tax revenue.

It is important to note that previous reports on the economic impacts of recreational use on the Upper Mississippi River System show a much higher impact than presented here. For example, the Corps of Engineers' 1993 report on economic impacts of recreation on the Upper Mississippi River System (USACE, 1993a) estimated recreational expenditures at $387 million, and economic output and jobs supported in adjacent counties of $200 million and 3,000, respectively. The report concluded that overall U.S. economic output resulting from recreation on the system at $1.1 billion per year and supporting 12,600 jobs.

The State of Wisconsin, using previous economic reports, estimated that the 19 counties adjacent to the Refuge accounted for 7.6 million visits, $255 million in economic output, and support for 4,580 jobs.

These differences compared to Refuge figures reflected above and in Table 19 can be attributed to a number of factors. Earlier reports were not Refuge-specific and covered areas beyond the Refuge. Refuge visitation figures only reflect people actually within the Refuge doing recreation and do not account for visits to private marinas; state, county, and Corps of Engineers recreation areas; persons traveling along the scenic byways adjacent to the Refuge; or general "tourism" visits to the host of communities adjacent to the Refuge. Thus, how one defines a visitor to the Refuge has a huge impact on the actual number of visits used in economic models, and visits drive the models. Refuge information in this section was also only for travel-related expenditures, and only for in-state impacts. Regardless of the estimates, the economic impact from recreation on the Refuge, and the Upper Mississippi River as a whole, is critical to the socioeconomic fabric of the area.

Commercial Use of Refuge

Commercial use of the Refuge consists of hunting, wildlife observation and fishing guides, commercial trappers, recreational fish float operators and commercial fishing. Farming, grazing and timber harvesting have a minimal impact on the Refuge. Commercial navigation passes through the Refuge.

Hunting, Fishing and Other Guide Services

A number of guides operate on the Refuge, providing services for anglers, hunters and wildlife observers. In recent years, the Refuge has averaged about 15 guides operating on the Refuge per year. Specific information on the number of clients, party size and client expenditures for guide services is not available, but it is estimated that each guide is engaged for about 30 – 40 trips per year. Guides who obtain permits from the Refuge pay $100 annually.

Table 20: Comparison of Trapping Seasons, Upper Mississippi River Refuge

Furbearer Trapping	Dates	Minnesota	Wisconsin	Iowa	Illinois
Muskrat	Start	1-Nov-03	10-Nov-03	1-Nov-03	5-Nov-03
	End	29-Feb-04	29-Feb-04	31-Jan-04	15-Jan-04
	# of Days	121	112	92	72
Otter	Start	Not Allowed	6-Dec-03	Continuously Closed	N/A
	End	N/A	7-Mar-04	N/A	N/A
	# of Days	0	93	0	0
Beaver	Start	1-Nov-03	8-Dec-03	1-Nov-03	5-Nov-03
	End	15-May-04[1]	15-Mar-04	15-Apr-04[1]	31-Mar-04[1]
	# of Days	197	99	167	148

1. Refuge season closes March 16.

Commercial Trapping

Muskrat, beaver, raccoon, and mink are the primary furbearing species harvested on the Refuge. A relatively few number of red fox and otter are also trapped. Over 75 percent of the animals trapped are muskrats. The average age of trappers continues to increase as fewer young trappers replace the older trappers who either quit or pass away. Four states overlap the Refuge, each with their own trapping regulations and seasons (Table 20). This is a source of confusion for some trappers, who must be well aware of what state they are in when trapping on the Refuge.

Trappers must have a Special Use Permit and pay an annual fee of $20.00 (since 2000) to trap on the Refuge. Annual revenue from trapping fees has averaged $4,740 since 2000. In the 2003-04 season , 245 active trappers spent an average of 24.1 days each trapping on the Refuge; they harvested 36,108 muskrats (Table 21). Based on an average price of $2.72 per pelt (based on a Wisconsin Department of Natural Resources survey, one local buyer, and two national auctions), gross revenue for the muskrat harvest by these trappers amounted to $98,214 (Table 21). Gross revenue for beaver was $29,835, for otter it was $4,117. Pelt prices vary considerably between years, for example, muskrat prices have ranged from $6.50 per pelt in 1979, to $4.00 in 1987, $1.00 in 1990, and $2-2.50 in 2004. Beaver sales at the North American Fur Auctions varied between $16 and $21 from 2000 to 2004. For further details on the Refuge's trapping program refer to Chapter 3, page 73.

Fish Float Operators

Fish floats are private businesses which provide fishing opportunities to the public for a fee. Operators pick up customers via boat and transport them to the fishing facility (float) below a lock and dam. There are currently four fish float operators within Refuge boundaries. About 15,000 anglers per year use the floats with the largest operator servicing about 6,000 anglers per year while the remaining operators average about 3,000 anglers each per year. For calendar year 2003 gross receipts ranged from $10,000 to $44,000 per float. Float operators are required to obtain an annual special use permit from the Refuge for a fee of $100.

Commercial Fishing

Commercial fishermen usually harvest 17 species of fish, plus turtles, within the Refuge (Pools 4-14). During the period 1998 to 2001, annual commercial catch within Refuge pools (Table 22) averaged 6.6 million pounds, with a gross value of $1.7 million (2003 dollars), based on ex vessel price per pound (the price paid to the commercial fisher dockside: i.e., before any processing or distribution). Commercial catch of turtles averaged 8,475 pound annually. People who fish commercially must obtain annual commercial fishing licenses issued by the four States. An individual commercial fisherman may require one or more licenses to cover the harvest of

Table 21: Estimated Gross Revenue from Furbearers Harvested by 245 Trappers During the 2003-2004 Trapping Season, Upper Mississippi River Refuge

Species	Fur Prices from Various Sources[1]				Average Price (Dollars)	Trapper-reported Harvest on Refuge	Gross Revenue (Dollars)
	Wisconsin Fur Prices	Fur Harvesters Auction, June 2004 (Dollars)	North American Fur Auctions, 2004 (Dollars	Wiebke Fur Company, LaCross Wis., November 2004 (Dollars)			
Beaver	15	17	21	15	17	1,755	29,835
Raccoon	12	14	n/a	11	12	1,533	18,907
Otter	89	84	105	80	90	46	4,117
Muskrat	2.65	3	n/a	2.50	2.72	36,108	98,093
Red Fox	21	n/a	20	15	19	4	75
Mink	19	13	n/a	11	14	380	5,447

1. *Fur prices rounded to the nearest dollar, except muskrat.*

Table 22: Summary of Commercial Fishing, Upper Mississippi River Refuge

Year	Species	Pounds of Fish	Value ($)[1]	Pounds of Turtles	Value ($)[1]	No. of Fishermen
Pools 4-14						
1998	17	6.25 million	1.50 million	8,900	4,100	599
1999	17	5.98 million	1.53 million	8,000	3,600	397
2000	17	5.61 million	1.49 million	9,000	4,700	537
2001	17	8.46 million	1.81 million	8,000	4,400	576
Spring Lake Pool 13						
1998	3	35,595	5,339	N/A	N/A	14
1999	3	63,557	10,169	N/A	N/A	13
2000	3	73,544	11,031	N/A	N/A	12
2001	3	38,322	5,365	N/A	N/A	8
2002	3	63,463	9,519	N/A	N/A	14
2003	3	57,532	8,629	N/A	N/A	14

1. *Minimum value ($) based on dead weight.*

various fish species and/or utilize different types of nets and lines. Therefore, annual data described herein (except Spring Lake, see below) are attributed to the number of licenses, not the number of commercial fishermen (Table 22). Between 1998 and 2001, an average of 527 commercial fishing licenses were issued to people who operate within Refuge pools. The annual gross revenue per commercial fishing license was $2,963.

The only location on the Refuge where commercial fishermen must have Refuge permits is on Spring Lake in Pool 13. During 1998-2003, an average of 13 fishermen were issued permits through the Savanna District office (Table 22). Total average annual harvest at Spring Lake was 55,335 pounds of fish, yielding an average gross income of $642 per fisherman. This low dollar value is based on the low-

est values fishermen are paid, based on whether fish are bought live, whole or processed.

Clamming

There is virtually no clamming industry on the Mississippi River at the present time. In the early 1990s clamming was a million dollar industry. The market for clams was primarily in Japan where the shell "seeds" were used to implant oysters for pearl production. However, in the late 1990s the combination of large stockpiles of shells and a disastrous red tide in Japan that destroyed oyster beds depressed the market for clamming. Today the price is what drives this industry and with the introduction of a synthetic bead into pearl production, it is not likely the local commercial clamming industry will be revived. In addition, some States are restricting commercial clamming activities because of population declines due to competition of invasive species, habitat changes, and changes in host fish populations.

As of the 2006-2007 season, all Wisconsin waters, including the Mississippi River, have been closed to commercial clamming. Wisconsin allows pearl hunting and personal clamming (up to 50 pounds per day) but it is illegal for anyone to sell or barter clams. Minnesota has also closed the clamming season on waters infested with zebra mussels to include the Mississippi River south of St. Anthony Falls (St. Paul, Minnesota). Iowa has closed the commercial clamming season in the Mississippi River along the Wisconsin/Iowa border, but not as yet on the Illinois border waters. Illinois allows commercial clamming on the Mississippi River but has one sanctuary in the Blanding Landing area of Pool 12.

Administration and Facilities

The Refuge is divided into four districts to optimize management, administrative, and public service effectiveness and efficiency. District offices are located in Winona, Minnesota (Pools 4-6), La Crosse, Wisconsin (Pools 7-8), McGregor, Iowa (Pools 9-11), and Savanna, Illinois (Pools 12-14). The Refuge currently has 37 permanent employees and an annual

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base operations and maintenance budget of $3.1 million.

The Refuge has its overall Headquarters in Winona, Minnesota, that provides administrative, biological, engineering, private lands, mapping, visitor services, planning, and policy support to the districts. District managers are supervised by the refuge manager located in Winona. Two other national wildlife refuges, Trempealeau NWR and Driftless Area NWR, are also part of the Refuge complex. Driftless Area NWR is under the supervision of the McGregor District manager.

The Headquarters office is currently in the old historic Exchange Building in downtown Winona, a building shared with private enterprise. Customers to these businesses provide a considerable distraction in terms of traffic and non-refuge-related inquiries. The building has no physical connection to the Refuge. The building offers little to no Refuge or Fish and Wildlife Service identity and very limited visitor parking. There are inadequacies in the heating and cooling system, disabled access, and staff parking. The building space is currently rented for $70,000 per year. The current lease expires in 2006. Boats and other vehicles and equipment are stored in a garage a few blocks away.

The Winona District is currently located on the second floor of the Exchange Building in downtown Winona, Minnesota as noted above for Headquarters. The same inadequacies affect the operation of Winona District. The District shop is one stall of an old garage attached to the Sign Shop several blocks away. Other storage includes an open pole barn built about 10 years ago. Both of these facilities are Fish and Wildlife Service-owned. With the pending

replacement of the Sign Shop, Winona will lose their current shop and storage facilities.

La Crosse District currently has a modern office and limited garage space that is rented through General Services Administration. The building is shared by Fisheries, Law Enforcement, and National Wetland Inventory staff. The building has a shared visitor contact component with exhibits, meeting rooms, and a cooperative sales area. The La Crosse District accounts for approximately $100,000 of the annual rental cost paid by the Service, and soon, the Region. The lease expired in December 2004 and was extended for 5 years, with an option to vacate in 3 years, or the end of 2007. The District also has a modest maintenance and storage facility built in the 1960s near La Crescent, Minnesota. This building is owned by the Fish and Wildlife Service, and needs to be replaced in a different location since it is in the floodplain. The current office, although modern and adequate, presents a high, re-occurring annual rental cost, is several miles from the Refuge, and is located in a highly developed retail business area of Onalaska. The office is difficult to find and not frequented by most people who use the Refuge.

The McGregor District office is currently Service-owned but on a small site with severe physical limitations due to tract size and a sheer bluff in the back and a major highway and rail line in front. Staff is crammed into tiny offices or divided areas/hallways, and an excess Federal Emergency Management Agency trailer is wedged between the office and the cliff. The office and trailer were cited in 2004 for several structural/location-related safety violations which are beyond the staff's control. The office turn from the highway is unsafe, and there is not enough space for parking. Staff park across the highway on private land, although this arrangement is dependent on the continued good will of the owner. Staged trains sometimes block access to personal vehicles. A small maintenance building is also on the site. Roof problems were repaired and the storage area expanded upward during a 2004 renovation, but the building is still judged inadequate from both a size and location standpoint. Three equipment storage buildings are located in Cassville, Lansing, and Genoa for logistical reasons given the size and length of the District. The Cassville and Genoa buildings were built in the 1960s and are reaching the end of their useful life. The Lansing building is newer and deemed adequate.

The Savanna District has an office and visitor contact station (Ingersoll Learning Center) on the Refuge adjacent to wildlife viewing areas and hiking/biking trails. However, the environmental education and interpretation program is limited by inadequate facility size. An equipment storage building was recently constructed, but the District has a tiny, outdated maintenance building.

The existing Lost Mound Unit office is an old Savanna Army Depot administrative building shared with the Illinois Department of Natural Resources. There is an area dedicated to locally prepared displays. Although part of the Savanna District, the Lost Mound Unit has its own identity and visitor-base from the Savanna Depot era, and promises to be a major attraction for visitors given its large size, location, unique wildlife and prairie, and history in the greater community. A new office and maintenance facility would enhance the Service's image and the quality of service and programs to the public.

Cultural Resources and Historic Preservation

Archeological records show evidence of human use along the Mississippi River from the earliest generally accepted cultural period, the Paleo-Indian tradition that commenced about 12,000 years before present. Archeologists hypothesize that small family-groups of hunters-gatherers roamed widely in search of mega-fauna and other resources. The presence of these people is usually recognized through surface finds of their fluted spear points. Such Paleo age materials (e.g., Quad/Chesrow points) are present within Pool 10 of the Refuge (Kolb and and Boszhardt, 2004).

Numerous sites from the following Archaic tradition have been found on the Refuge. People of this 6,000-year long tradition adapted their subsistence practices to changing environmental, habitat, and resources based changes including the 2,000-year very warm and dry altithermal that ended about 5,000 years ago. Extensive trade routes brought in exotic materials. People buried their dead in natural knolls. Archaic tradition cultural practices gradually evolved into the subsequent Woodland tradition.

Commencing around 3,000 years ago was the Woodland tradition. Archeological sites are widespread in the Refuge and usually include pottery, arrowheads, and artificial mounds used for human burials and for other purposes. People exploited a wide range of habitats in an environment similar to

that found in the early historic period. The people lived in larger, semi-permanent villages, practiced horticulture, and at some period participated in long distance trade. In some respects, Europeans coming into the Upper Mississippi River valley encountered people of the Woodland culture, some of whom may have been the ancestors of the Eastern Dakota Indians.

The Mississippian period started in the Saint Louis area about 1,000 years ago and moved up the Mississippi River. But few archeological sites of that period have been found in the Refuge area. A related cultural group known as the Oneota, which may have developed from the Late Woodland culture, is more evident in the archeological record. Late Oneota people probably were the ancestors of the Ioway, Oto, Missouria, and Winnebago Indian tribes.

The Upper Mississippi River was, of course, the major route of European-based exploration and subsequent Western culture population growth and development. Archeological sites associated with exploration, military activities, the fur trade, lead and zinc mining, lumbering, steamboats, bridges, railroads, and conservation are known or expected along most of the river.

The following listed Indian tribes have been recognized by the federal government or self-identified by the tribe as having a potential concern for traditional cultural resources, sacred sites, and cultural hunting and gathering areas in the counties in which the Refuge is located.

Bad River Band, Chippewa
Boise Forte Band, Chippewa
Fond du Lac Band, Chippewa
Grand Portage Band, Chippewa
Lac Courte Oreilles Band, Chippewa
Lac du Flambeau, Chippewa
Leech Lake Band, Chippewa
Mille Lacs Band, Chippewa
Red Cliff Band, Chippewa
Red Lake Band, Chippewa
Sandy Lake Band, Chippewa
Sokaogon Chippewa
Devils Lake (Spirit Lake) Sioux
Flandreau Santee Sioux
Lower Brule Sioux
Lower Sioux Mdewakanton
Prairie Island Sioux
Santee Sioux
Shakopee Mdewakanton Sioux
Sisseton-Whapeton Sioux
Upper Sioux Community
Iowa Tribe of Kansas
Iowa tribe of Oklahoma
Menominee Indian Tribe
Miami Tribe
Stockbridge-Munsee
Peoria Indian Tribe
Citizen Potawatomi
Forest County Potawatomi
Hannahville Indian Community, Potawatomi
Prairie Band of Potawatomi
Sac & Fox Nation of Missouri
Sac & Fox Tribe of the Mississippi
Ho-Chunk Nation
Winnebago Tribe of Nebraska

Although Indian tribes are generally understood to have concerns about traditional cultural properties, other organizations such as church congregations, civic groups, and county historical societies could have similar concerns.

The Refuge archeological collections contain prehistoric artifacts currently not associated with any modern tribe. Furthermore, the collections contain human remains but no funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act. Although not all sites of historic period Indian occupation have been identified on the Refuge, they could be located and could contain cultural items.

The Refuge has museum collections that are managed under a Refuge Scope of Collection Statement dated October 31, 1994. To date, 108 archeological and geomorphological and history and research investigations have produced a calculated 129,339 artifacts from Refuge lands; artifacts are or will be stored at several repositories under terms of cooperative agreements. Artifacts are owned by the federal government and can be recalled by the Service at any time. Some historic items and historic documents are housed at the Refuge headquarters. From 1999 through 2001 the Refuge contracted to have the documents and photographs scanned into a data base.

A cultural resources overview and management study was prepared in 2003 as part of the Comprehensive Conservation Plans for the Refuge and Trempealeau National Wildlife Refuge (Gregory, et al., 2003). The document is available at Refuge Headquarters, Winona, Minnesota. The report presents a cultural history beginning 12,000 years ago through prehistoric and historic periods, ending in the 20th century. An inventory of cultural sites is not included in that document. However, a list is available upon request. Sites are recorded by fee-title and by cooperative agreement with the U.S. Army Corps of Engineers. The list is too long to include in this document. The document has a chapter about consultation processes identified in the National Historic Preservation Act of 1966 as amended, and a chapter that summarizes the methodology of, and responses to, a questionnaire sent to over 200 tribal communities, historical societies, and research groups who have potential interest in resources on the Refuge. The report concludes that a variety of cultural resources must be considered during any field project associated with the Refuge. A comprehensive bibliography of cultural resources reports produced for Refuge studies is also included. Finally, a supplement to the report contains a manual for Native American Consultation documents that may be used or modified for Service purposes.

Cultural resources are an important part of the nation's heritage. The U.S. Fish and Wildlife Service is committed to protecting valuable evidence of human interactions with each other and the landscape. Protection is accomplished in conjunction with the U.S. Fish and Wildlife Service's mandate to protect fish, wildlife, and plant resources. The Refuge is fully aware of cultural resource management challenges presented by physical changes brought on by erosion and accretion of sediments in riverine settings. Artifact looting is also a management concern.

Chapter 4: Management Direction

Introduction

This chapter presents the objectives and strategies that will guide management and administration of the Refuge over the next 15 years, or through 2021. This management direction, along with maps in Appendix E, represents the plan for the Refuge and mirrors Alternative E in the Final EIS/CCP prepared as part of the planning process. Table 23 on page 139 and Table 24 on page 146 summarize and compare the existing condition/program with action in this CCP.

Elements Common to All Objectives

Interagency Coordination and Collaboration

The Refuge is situated in a complex geopolitical landscape involving four states and two Corps of Engineers Districts, each with varying missions, authorities, and constituencies. Interagency coordination was discussed in Chapter 1 and is an important element common to all objectives, and indeed, will be critical to carrying out the CCP. Existing plans and agreements such as the Land Use Allocation Plan and Service-Corps of Engineers Cooperative Agreement will continue to serve as guides for day-to-day Refuge decisions and implementation of the CCP. Also critical will be the continued involvement of various established interagency forums, committees, and associations.

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Agency Access to Restricted Public Use Areas (Waterfowl Hunting Closed Areas, Slow, No Wake Areas, and Electric Motor Areas)

Special area regulations are general public use regulations and not intended to apply to state, federal, and local agencies or offices engaged in bona fide fish and wildlife management, monitoring, and enforcement. However, it is hoped that all agencies use discretion and good judgment when working in areas or with equipment the general public is restricted from using. This is important from both a wildlife disturbance and public perception standpoint.

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National Environmental Policy Act (NEPA) Compliance

Since this CCP is programmatic in many issue areas, it may not contain the necessary detail on every future action outlined to adequately present and evaluate all physical, biological and socioeconomic impacts. For example, although the CCP may show the number and location of constructed features such as trails, overlooks, boat ramps, and offices, exact sites, size, design, and other features would be determined at a later date depending on funding and implementation schedules. Another example is the various sub or "step-down" plans required for various management actions such as forestry, biological monitoring, fishery and mussel resources, hunting, and trapping. Thus, before certain objectives or actions are implemented, a decision will be made in coordination with the Regional NEPA Coordinator on whether the EIS was adequate for each specific construction, planning, or other action, or whether separate step-down NEPA compliance (categorical exclusions or environmental assessments) is needed.

Threatened and Endangered Species Protection

Although different levels of monitoring for threatened and endangered species are proposed in the CCP, protection of these species is common across all objectives. The protection of federally-listed species is the law of the land through the Endangered Species Act of 1973. It is also Service policy to give priority consideration to the protection, enhancement, and recovery of these species on national wildlife refuges (7 RM 2). To ensure adequate protection, the Refuge is required to review all activities, programs, and projects occurring on lands and waters of the Refuge to determine if they may affect listed species. If the determination is "may affect," the Refuge does a formal consultation with the responsible Ecological Services office of the Service.

Archeological and Cultural Resource Protection

Cultural resources on federal lands receive protection and consideration that would not normally apply to private or local and state government lands. This protection is through several federal cultural resources laws, executive orders, and regulations, as well as policies and procedures established by the Department of the Interior and the Service. The presence of cultural resources including historic properties cannot stop a federal undertaking since the several laws require only that adverse impacts on historic properties be considered before irrevocable damage occurs. However, the Refuge will seek to protect cultural resources whenever possible.

During early planning of any projects, the Refuge will provide the Regional Historic Preservation Officer (RHPO) a description and location of all projects and activities that affect ground and structures, including project requests from third parties. Information will also include any alternatives being considered. The RHPO will analyze these undertakings for potential to affect historic properties and enter into consultation with the State Historic Preservation Officer and other parties as appropriate. The Refuge will also notify the public and local government officials to identify any cultural resource impact concerns. This notification is generally done in conjunction with the review required by the National Environmental Policy Act or Service regulations on compatibility of uses.

Fire Management

The suppression of wildfires and the use of prescribed or controlled fire are a long-standing part of resource protection, public safety, and habitat management on national wildlife refuges. In 2002, a comprehensive Fire Management Plan was approved for the Refuge and provides detailed guidance for the suppression or use of fire. The plan outlines wildfire response and prescribed fire objectives, strategies, responsibilities, equipment and staffing; burn units; implementation; monitoring; and evaluation. The complete Fire Management Plan and Burn Unit Maps are available at the Winona Headquarters Office, or on-line at http://midwest.fws.gov/planning/uppermiss/index.html.

Prescribed fire will be used every 3-5 years on approximately 5,700 acres of Refuge grassland. This area is divided into approximately 40 burn units, most of which range in size from 1 to 125 acres. These units are scattered throughout the Refuge and include islands and natural rises or terraces in the floodplain, and former agricultural fields in or adjacent to the floodplain. Units are generally isolated from private dwellings or other development and they are generally flat or gradually sloping. During a recent 10-year period, the yearly average was eight prescribed burns on a total of 160 acres. Most burns occurred during the April-May time period. The annual average acreage burned is expected to increase due to the 2001 addition of the Lost Mound Unit, Savanna District, which includes approximately 4,000 acres of native prairie, a fire-dependent ecosystem.

Each prescribed burn is governed by a specific prescribed burn plan which dictates the criteria or prescription for air temperature, fuel moisture, wind direction and velocity, soil moisture, relative humidity, and other environmental factors. Burns are not conducted unless these prescriptions are met, and possible impacts to archaeological resources or endangered species avoided or mitigated. Each plan also outlines required staffing and equipment including contingency actions for smoke management and escaped fire. Coordination with local and state fire management officials, as well as adjacent landowners, is done prior to conducting a burn. A strict chain-of-command and "burn-no burn" protocol is followed.

General Water-Based Recreation

Due to the Refuge's overlap with varied jurisdictions, navigable waters, and a major commercial navigation project, existing uses related to water recreation will not be eliminated and their continuation is common to all objectives. These water-based uses include, but are not limited to, powerboating, waterskiing, jetskiing or other personal watercraft use, sailing, swimming, picnicking, and social gatherings. However, these uses will continue to be subject to applicable Refuge, state, Corps of Engineers, and Coast Guard regulations, and may be restricted in terms of location and/or season in some elements of some of the objectives presented.

Mosquito Management

Although not specifically raised as an issue during scoping and public involvement, the management of mosquito populations may emerge as a future concern given the increased incidence of mosquito-borne illnesses in parts of the Midwest. Due to the possible harmful effects, mosquito population control will only be allowed in cases of a documented health emergency by state departments of health or similar disease control agencies. Control efforts would be species and location specific, based on population sampling and identified population thresholds, and use the least intrusive means possible.

Fish and Wildlife Disease Control

Periodically, the Refuge may experience threats to fish and wildlife from a variety of ongoing or sporadic outbreaks of diseases or ailments such as Chronic Wasting Disease in deer and avian botulism, trematode infestations, or avian cholera in waterfowl. Appropriate control efforts will be undertaken if warranted, feasible, and effective to limit the impacts on fish and wildlife populations. The Refuge will cooperate and coordinate with the states in these efforts. The Refuge has prepared a

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Chronic Wasting Disease monitoring and surveillance plan which details efforts with the states on this disease.

Volunteers and Friends Groups

The Refuge currently has an active volunteer program involving dozens of citizens. These volunteers contribute over 8,000 hours annually, assisting with a full-range of administrative, biological monitoring, invasive species control, and visitor services tasks. The nurturing and use of volunteers will continue and is a vital component of many of the objectives in the CCP. The Refuge also has an active friends group called the Friends of the Upper Mississippi River Refuges (FUMRR). This citizen-based support group raises funds for needed projects, conducts special programs which support the goals of the Refuge and the mission of the Refuge System, and serves as an advocate for the Refuge at various levels of government. Like volunteers, FUMRR will play an important role in the strategies to achieve many of the objectives outlined in this document.

Goals, Objectives and Strategies

Goal 1: Landscape

We will strive to maintain and improve the scenic qualities and wild character of the Upper Mississippi River Refuge.

Objective 1.1: Maintain the Integrity of the Refuge Boundary

In coordination and cooperation with the Corps of Engineers, identify, survey, and post all boundary lines where threat of encroachment is greatest by 2021.

Rationale: Maintaining and enforcing a boundary is one of the basic and critical components of Refuge management to ensure the integrity of an area over time. Without attention to this basic task, there is a tendency for adjacent development and use to creep and take over Refuge lands and waters. This encroachment includes tree cutting, dumping, construction, storing of equipment and materials, and mowing Refuge lands. In addition, there are a few boundaries between Refuge and Corps of Engineers-managed lands that remain unclear, leading to mixed messages to the public using these lands via permits, leases, or out grants. The size, length, age,

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and floodplain setting of the Refuge, coupled with a mix of Corps of Engineers-acquired and Service-acquired lands, creates boundary clarity problems that can only be addressed through modern re-surveying techniques. This objective also focuses on problem areas versus the entire boundary to reflect the realities of survey time and costs.

Strategies

1. Conduct an annual review of the posted Refuge boundary to detect and address any encroachment incidents, and coordinate enforcement with the Corps of Engineers and states as appropriate.
2. In collaboration with the Corps of Engineers, identify and prioritize boundary areas most in need of clarification by surveying and reposting.
3. Seek joint Corps of Engineers and Service funding to complete needed surveys based on priorities.
4. In collaboration with the Corps of Engineers and the states, and with appropriate public involvement, review, update, and publish a new Land Use Allocation Plan for lands within the Refuge (see Chapter 1 for discussion of this plan).

Objective 1.2: Land Acquisition

By 2021, acquire from willing sellers 58 percent of the lands identified for acquisition in the 1987 Master Plan and subsequent approvals, as identified on the maps in Appendix G of the Final EIS/CCP (approximately 1,000 acres/year).

Rationale: Land acquisition is a critical component of fish and wildlife conservation since it permanently protects their basic need of habitat. It is also a cornerstone of promoting wildlife-dependent recreation by providing lands and waters open to all. On a narrow, linear refuge, land acquisition is a critical component of restoring habitat connectivity needed for the health of many species. The Refuge currently ranks sixth nationally on the Service's Land Acquisition Priority System due to its resource importance. Land acquisition can also be cost effective in the long-term due to inflation of land costs and the costs of acquiring undeveloped land versus developed land that also needs restoration. This objective represents an aggressive land acquisition program of about 1,000 acres per year to achieve goals set in the 1987 Master Plan and other approved acquisition documents. Lands with the highest fish and wildlife values were coded "A" in the 1987 Master Plan, and this ranking system remains a useful prioritization tool. However, public use values would also be considered when setting priorities between available tracts in keeping with the balanced approach of this alternative.

Strategies

1. Seek consistent Land and Water Conservation Fund appropriations to meet the objective (approximately $1.5 million per year at $1,500 per acre).
2. Explore land exchanges with the states to remove intermingled ownerships.
3. Continue to work with the Department of the Army to transfer title of tracts as they are cleaned of contaminants at the Lost Mound Unit (former Savanna Army Depot).

Objective 1.3: Bluffland Protection

By 2021, acquire from willing sellers protective easements or fee-title interest in all undeveloped bluffland areas within the approved boundary of the Refuge as identified in the 1987 Master Plan. (See maps in Appendix G of the Final EIS/CCP.)

Rationale: There have been no acquisitions of bluffland areas since first identified in the 1987 Master Plan, and this objective represents a more aggressive approach to safeguarding the wildlife values of these areas. In recent years, Peregrine falcons have once again started nesting on the rock faces of some bluffs. Peregrines, at one time an endangered species, were the main rationale for including the 13 areas in the acquisition boundary. Blufflands are also an important part of maintaining the scenic quality of the Refuge landscape and harbor unique and diverse plants and animals. Since some areas identified have been developed for housing or other uses since 1987, the focus would be on the undeveloped areas. However, there may be an opportunity to protect remaining values of these developed areas through creative easements. Fee or easement acquisition authority was granted by Regional Director approval of the 1987 Master Plan and is in addition to original acquisition authority in the 1924 act creating the Refuge and authorizing acquisition of lands subject to overflow.

Strategies

1. Seek consistent acquisition funding as noted in Objective 1.2 and use a blend of easements and fee-title acquisition that best meets landowner's desire and balances wildlife and public use objectives.
2. Work with the state, local governments, and private land trusts to protect bluffland habitat and scenic values.
3. Work with local units of government to encourage zoning regulations that protect bluffland scenic qualities.
4. Educate the public on the values of blufflands for birds and unique plant communities.

Objective 1.4: Research Natural Areas and Special Designations.

By 2010, complete a management plan for each of the Refuge's four federally-designated Research Natural Areas. No new Natural Areas would be established. (See maps in Appendix E and Table 24 on page 146.) Also by 2008, facilitate preparation of a nomination package for designating the Refuge a "Wetland of International Importance" in accordance with the Ramsar Convention.

Rationale: The Refuge has done little in the way of monitoring or research on the existing Research Natural Areas. Although the main goal of the area designation is the preservation of unique floodplain forest areas, preservation may often entail some

level of management. No management plans have been written to guide monitoring and research of current habitat conditions and changes since the areas were designated in the 1970s. Completing a management plan for each area would identify monitoring protocols, any habitat management needed to retain original biological values or address threats, address any special public use considerations, and identify ways to foster public awareness and appreciation of these unique areas. No areas of the Refuge are deemed suitable for new Natural Area designation.

Designating the Refuge a Wetland of International Importance would raise its stature in line with previously designated national wildlife refuges including Horicon National Wildlife Refuge in Wisconsin and Sand Lake National Wildlife Refuge in South Dakota. Designation would recognize the Refuge's international importance to migratory birds, as well as its uniqueness in balancing a variety of commercial, cultural, and recreational values, values supported in the 115-nation treaty stemming from the Ramsar Convention and reflected in this integrated CCP. Designation would also foster the sharing of scientific information and elevate management attention when facing future needs and challenges. Designation does not relinquish sovereignty or jurisdictions in any manner.

Strategies

1. The District Managers will be responsible for completion of management plans for natural areas in their respective Districts, using a consistent approach and format, and in cooperation with the states and other federal agencies as appropriate (e.g. Nelson-Trevino).
2. Seek cooperative research and monitoring opportunities with other agencies and colleges and universities.
3. Ensure yearly review of Research Natural Area boundaries to ensure integrity of the areas.
4. Work collaboratively with the Corps of Engineers, the states, non-government organizations, and the public in preparing a nomination package for Wetland of International Importance designation.

Goal 2: Environmental Health.

We will strive to improve the environmental health of the Refuge by working with others.

Objective 2.1: Water Quality.

Working with others and through a more aggressive Refuge program, seek a continuous improvement in the quality of water flowing through and into the Refuge in terms of parameters measured by the Long Term Resource Monitoring Program of the Environmental Management Program (dissolved oxygen, major plant nutrients, suspended material, turbidity, sedimentation, and contaminants).

Rationale: The quality of water on the Refuge is one of the most important factors influencing fish, wildlife, and aquatic plant populations and health, which in turn influence the opportunity for public use and enjoyment. Water quality is also beyond the Refuge's ability to influence alone given the immense size of the Refuge's watershed and multiple-agency responsibilities. This objective recognizes these limitations, but charts a more aggressive role for the Refuge through the strategies below. The objective also highlights the advocacy role the Refuge can play in educating the public and supporting the myriad of agencies which together can influence water quality.

Strategies

1. Hire a Private Lands Biologist or Technician for each of the Refuge's four Districts to restore and enhance wetland, upland, and riparian habitat on private lands in and along sub-watersheds feeding into the Refuge, and to broker the myriad of private land and conservation opportunities available through the Department of Agriculture and others.
2. Take an active role in the Midwest Driftless Area Restoration Effort, part of the National Fish Habitat Initiative, which seeks to protect, restore, and enhance riparian and aquatic resources in the Driftless Area which adjoins much of the Refuge.
3. Increase conservation assistance agreements with Soil and Water Conservation Districts and Resource Conservation and Development boards.
4. Begin a regular and recurring dialogue with U.S. Geological Survey scientists at the Upper Midwest Environmental Sciences Cen-

ter, La Crosse, Wisconsin, to help devise and fine tune strategies specific to addressing sedimentation problems.

5. Cooperate with local government land use planning efforts to ensure that water quality impacts to the Refuge are considered.
6. Emphasize water quality aspects, especially sediment deposition in backwaters, in all habitat enhancement projects.
7. Link planning and projects for tributary watersheds to Environmental Pool Plan implementation using the latest GIS-based mapping and modeling.
8. Support cooperative water quality monitoring and improvement efforts through the Upper Mississippi River Conservation Committee and other groups and agencies.
9. Continue to stress the importance of water quality in public information, interpretation, and environmental education programs.

Objective 2.2: Water Level Management.

By 2021, in coordination with the Corps of Engineers and the states, complete as many pool-wide drawdowns as practicable based on ecological need, engineering feasibility, and available funding.

Rationale: Lowering the water levels in impoundments during the growing season is a proven management practice to increase emergent vegetation. Improved vegetation results in more food and cover for a wide range of fish and wildlife species, which in turn enhances opportunities for wildlife-dependent recreation. Much of the emergent vegetation on the Refuge has been lost due to stable water regimes created for navigation, and this objective seeks to restore productive marsh habitat to thousands of acres. Although drawdowns show great promise in enhancing aquatic vegetation in all pools, priorities and timing need to be tempered by ecological need, feasibility, and funding.

Strategies

1. Continue to work in partnership with the Water Level Management Task Force to plan, facilitate, and prioritize drawdowns.
2. Inform and involve citizens through public meetings, workshops, and citizen advisory groups.
3. Seek all available funding sources to carry out needed recreational access dredging to lessen social and economic impacts during drawdowns (proposals in Corps of Engineers Navigation Study released in 2004 includes funding for drawdowns).
4. Explore options for funding an Access Trust Fund to ensure adequate funding for additional public access (temporary or new landings, supplemental dredging, etc.) when needed to accomplish drawdowns.

U.S. Fish and Wildlife Service

Objective 2.3: Invasive Plants.

Continue current control efforts and by 2008, complete an invasive plant inventory. By 2010, achieve a 10 percent reduction in acres affected by invasive plants such as purple loosestrife, reed canary grass, Eurasian milfoil, leafy spurge, crown vetch, Russian knapweed, knotweed, European buckthorn, garlic mustard, and Japanese bamboo. Emphasize the use of biological controls.

Rationale: Invasive plants continue to pose a major threat to native plant communities on the Refuge and beyond. Invasive plants displace native species and often have little or no food value for wildlife. The result is a decline in the carrying capacity of the Refuge for native fish, wildlife, and plants, and a resulting decline in the quality of wildlife-dependent recreation. This objective addresses invasive plants by continuing current efforts while determining and mapping baseline information so that effective and efficient long-term control can take place. Biological control includes release of insects which prey directly on purple loosestrife or leafy spurge plants or disrupt part of their life cycle, and is a more long-term and cost efficient solution compared to herbicide spraying. This objective is tempered by the

realization that biological control methods are not yet readily available for a large number of invasive plant species.

Strategies

1. Hire seasonal biological technicians to conduct an inventory and prepare baseline maps of invasive plant infestations.
2. Write an invasive plant control and management plan (integrated pest management plan) that identifies priority areas and methods of control.
3. Seek seasonal staff and funding to accelerate current control and applied research efforts through interagency partnerships, volunteer programs, and public education.
4. Continue to work with the Department of Agriculture, other agencies, the states, and other refuge field stations in securing insects and beetles for release in high-infestation areas.
5. Continue coordination with the Corps of Engineers on efforts to control invasive forest plants through their operations and maintenance program and other potential authorities.
6. Take advantage of periodic invasive grant, cost-sharing, or special funding opportunities offered through the Service or other agencies and foundations.
7. Conduct public information effort including media, brochures, signage, and programs to increase awareness of the invasives threat and what visitors can do to minimize the introduction or spread of invasives.

Objective 2.4: Invasive Animals.

Increase efforts to control invasive animals through active partnerships with the states and other Service programs and federal agencies, and increase public awareness and prevention.

Rationale: Invasive animals such as zebra mussels and Asian carp species pose a current and looming threat to native fish and mussel species and have the potential to disrupt the aquatic ecosystem. They can also have a direct link to the quality of fishing by displacing various game fish, or destroying important habitat for fish and wetland-dependent birds which people observe or hunt. This objective is not measurable, reflecting the reality that invasive animal species do not lend themselves to direct control in a large river system and that addressing invasive animals is dependent on political and management actions beyond the boundary of the Refuge. However, the objective does emphasize the importance of addressing invasive species and represents more active Refuge involvement.

Strategies

1. Use the visibility and public awareness of the Refuge as a platform or "bully pulpit" to inform the public, decision-makers, and elected representatives of the seriousness of the invasive animal threat to the ecology and economy of the Upper Mississippi River System.
2. Continue to seek ways to help the states implement their Aquatic Nuisance Species plans and consider and incorporate these plans in Refuge invasives efforts.
3. Whenever possible, assist with implementation of the Asian Carp Working Group's Management and Control Plan for Asian Carps in the United States (prevent, contain and control, reduce, minimize impacts, increase public information, research, and effective national coordination).
4. Continue monitoring, sampling, research, and exploration of management options to address spring and fall waterbird mortality in Pools 7 and 8 resulting from ingestion of trematodes associated with the invasive faucet snail (*Bithynia tentaculata).*
5. Implement other objectives and strategies in the CCP which have an influence on invasive species work. For example, better habitat conditions promote healthy native fish populations that can compete with invasive species, while adding a fishery biologist to the staff would increase and improve coordination with other programs and agencies dealing with invasives.
6. Continue to work with other agencies in developing effective regulations, barriers, biological controls, or other means to reduce introduction and spread of invasives.
7. Explore new and creative ways to expand the harvest of invasive fish by commercial fishing, such as a bonus payment to enhance market price.
8. Conduct public information effort including media, brochures, signage, and programs to increase awareness of the invasives threat and what visitors can do to minimize the introduction or spread of invasives.

Goal 3: Wildlife and Habitat.

Our habitat management will support diverse and abundant native fish, wildlife, and plants.

Objective 3.1: Environmental Pool Plans.

By 2021, in cooperation with various agencies and states, implement at least 30 percent of the Refuge-priority Environmental Pool Plan actions and strategies in Pools 4-14 as summarized in Table 25 on page 147 (see Appendix N of the Final EIS/CCP for examples of Environmental Pool Plan maps).

Rationale: Environmental Pool Plans represent a desired future habitat condition developed by an interagency team of resource professionals, including Refuge staff. The Pool Plans represent what is necessary to reverse the negative trends in habitat quality and quantity on the Upper Mississippi River. Improved habitat is the key to healthy fish and wildlife populations, which in turn impact the quality of wildlife-dependent recreation. Thus, this objective represents an important part of the wildlife and integrated public use focus alternative. The Refuge represents a sizeable subset of the habitat vision presented in each Pool Plan. The Refuge also has different resource mandates and responsibilities than the Corps of Engineers and the states. Thus, the Refuge prioritized various actions to meet these needs as represented in Table 25 on page 147. The objective of 30 percent represents a reasonable rate of implementing priority actions given current funding levels (mainly through the Environmental Management Program, Corps of Engineers) for habitat conservation work, and the 15-year horizon of this CCP versus the 50-year horizon of the Pool Plans. Some of the actions and strategies in the table overlap with other objectives in this plan (e.g. forest management, land acquisition, watershed work, and water level drawdowns).

Strategies

1. Continue to coordinate with the River Resources Forum's Fish and Wildlife Workgroup, and the River Resources Coordinating Team's Fish and Wildlife Interagency Committee, to implement pool plan priorities.
2. Continue to work for full and expanded funding of the Environmental Management Program through public and Congressional information and outreach.
3. Continue to seek opportunities through the Corps of Engineers' Channel Maintenance Program to implement certain aspects of pool plans.
4. Take advantage of any new funding sources that emerge, such as the Corps of Engineers' Navigation and Environmental Sustainability Program which could be authorized and funded by Congress.
5. Complete a required Refuge Habitat Management Plan which integrates species status and trends with the Environmental Pool Plans (see related Objective 3.3).

Objective 3.2: Guiding Principles for Habitat Management Programs.

Adopt and use the following guiding principles when designing or providing input to design and construction of habitat enhancement projects:

Management practices will restore or mimic natural ecosystem processes or functions to promote a diversity of habitat and minimize operations and maintenance costs. Mimicking natural processes in an altered environment often includes active management and/or structures such as drawdowns, moist soil management, prescribed fire, grazing, water control structures, dikes, etc.

Maintenance and operation costs of projects will be weighed carefully since annual budgets for these items are not guaranteed.

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Terrestrial habitat on constructed islands and other areas needs to best fit the natural processes occurring on the river, which in many cases will allow for natural succession to occur.

If project features in Refuge Waterfowl Hunting Closed Areas serve to attract public use during the waterfowl season, spatial and temporal restrictions of uses may be required to reduce human disturbance of wildlife.

The esthetics of projects, in the context of visual impacts to the landscape, should be considered in project design in support of Refuge Goal 1, Landscape.

Rationale: Guiding principles for habitat restoration or enhancement projects would provide consistency between the four Districts of the Refuge and help communicate to cooperating agencies and the public standards from which we approach the design of projects. The principles will also help ensure compliance with Service policy on biological integrity and recognize the need to consider future operations and maintenance costs before doing projects. In addition, the principles help ensure that projects complement, rather than compete with, other goals and objectives in this plan.

Strategies

1. Refuge staff will use these guidelines when proposing and designing habitat enhancement projects funded by the Service. They will also be used during coordination with the Corps of Engineers and the states in cooperative programs such as the Environmental Management Program or any new program authority that may arise from the Corps of Engineers' Navigation Study. In cooperative projects done on the Refuge, other agency guidelines will also be considered.

Objective 3.3: Monitor and Investigate Fish and Wildlife Populations and Their Habitats.

By January 2008, amend the 1993 Wildlife Inventory Plan to include more species groups such as fish, reptiles, mussels, and plants, and increase the amount of applied research being done on the Refuge.

Rationale: Monitoring is essential to understanding the status and trends of selected species groups and habitats. This in turn provides some indication of overall biological integrity, diversity, and environmental health of the Refuge, and is critical in planning habitat management and public use programs. This objective represents a more aggressive biological program on the Refuge and will help meet directives in the Refuge Improvement Act requiring monitoring the status of fish, wildlife, and plant species. Better biological information is also critical to making sound and integrated resource and public use management decisions. The Refuge would continue to support and use monitoring done by the states, U.S. Geological Survey, the Corps of Engineers, and others to help fill the gaps in status and trends information for fish, mussels, reptiles, forests and other land cover, and environmental factors such as water chemistry and sedimentation.

Strategies

1. Engage other experts and partners to develop and implement the Wildlife Inventory Plan.
2. In developing the Wildlife Inventory Plan, consult each state's Comprehensive Wildlife Conservation Plan for areas of mutual need and opportunity in regard to monitoring and research.
3. Establish a Refuge Research Team that designs short-term and long-term research projects to address management questions and concerns about wildlife populations and their habitat.
4. Continue to work with the states, U.S. Geological Survey, and Corps of Engineers in the sharing of data on other species and habitats.
5. Establish a schedule of formal coordination meetings with the U.S. Geological Survey to share biological monitoring methods and data.
6. Ensure that each District has a biologist on staff and that Headquarters has a GIS biologist.
7. Seek more cooperation with colleges and universities to foster more graduate research projects.
8. Continue to use volunteers for certain monitoring efforts such as point counts for breeding and migrating birds.

Objective 3.4: Threatened and Endangered Species Management.

By the end of 2008, begin monitoring of all federally listed threatened or endangered and candidate species on the Refuge, and by 2010, have in place management plans for each species to

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help ensure their recovery. Cooperate with the states in the monitoring and management of state-listed species.

Rationale: As noted in an earlier section of this chapter, it is Service policy to give priority consideration to the protection, enhancement, and recovery of these species on national wildlife refuges. This objective represents a more aggressive approach to achieving this policy, and also reflects the high public interest in threatened and endangered species. Currently, the only species actively monitored by the Refuge are Bald Eagles, and efforts would be expanded to include the Higgins eye pearlymussel, eastern massasauga rattlesnake, and sheepnose mussel. Strategies below also recognize the importance of considering state-listed species in monitoring and management activities.

Strategies

1. Consider the needs of federal and state-listed threatened, endangered and candidate species, as applicable, in all habitat and public use management decisions.
2. Continue to consult with the Service's Ecological Services Offices on all actions which may affect listed species, and coordinate with the states on actions that may affect state-listed species.
3. In the Wildlife Inventory Plan, address a monitoring plan for all federally listed or candidate species, and consider state-listed species and "Species of Greatest Conservation Need" in state Comprehensive Wildlife Conservation Plans, to help detect serious problems early and to preclude listing.
4. Continue monitoring Bald Eagle nesting populations and success, and conduct periodic peak spring Bald Eagle migration counts.
5. In the Habitat Management Plan, identify steps needed to ensure populations of listed or candidate species are sustained in support of delisting or to preclude listing in the future.
6. Give priority to acquisition of lands within the approved boundary that contain listed or candidate species.
7. Continue assistance to other offices and agencies with Higgins eye pearlymussel recovery efforts.
8. Increase education and outreach specifically targeting threatened and endangered species found on the Refuge.

Objective 3.5: Furbearer Trapping.

Update the Refuge trapping plan by June 2007, continuing the existing trapping program until the update is completed and ready for implementation.

Rationale: Furbearer trapping has a long history on the Refuge and can be an important management tool in reducing furbearer disease and habitat impacts, and in safeguarding certain Refuge infrastructure such as dikes, islands, and water control structures. Trapping is also important from a recreational and cultural standpoint, providing hundreds of trappers thousands of hours of wildlife-related and outdoor-dependent enjoyment. Trappers also provide valuable information on habitat conditions and wildlife population and use trends due to their frequent, first-hand experiences and annual reporting. The current trapping plan is dated by time (1988), new furbearer ecology and population information, and by new policies governing compatibility of uses and commercial uses on national wildlife refuges.

Strategies

1. Seek input from state furbearer biologists, current Refuge furbearer trappers, and trapping organizations to assess effectiveness and/or needed changes in trapping program administration and management.
2. The Refuge wildlife biologists, in consultation with Refuge District managers, state furbearer biologists, and the Refuge Manager, will develop a draft trapping plan.
3. Afford the public an opportunity for review and comment on a draft plan and accompanying environmental assessment and compatibility determination.

4. Following public review and revision, submit a final plan to the Regional Director of the Service, Twin Cities, Minnesota, for approval (required).
5. Conduct appropriate information and education effort on any changes reflected in the plan.

Objective 3.6: Fishery and Mussel Management.

By the end of 2008, complete a Fishery and Mussel Management Plan for the Refuge which incorporates current monitoring and management by the states, the Corps of Engineers, and other Service offices and agencies.

Rationale: One of the purposes of the Refuge is to provide a "refuge and breeding place for fish and other aquatic animal life." Fish and mussels also have high intrinsic, recreational, and commercial values. For decades, the Refuge has not taken an active role in fishery or mussel management, deferring to the states or others on this management responsibility. Although the states will still play the lead role in fisheries and mussel management, the Refuge should have in place a plan which communicates to the states and the public the Refuge and Service perspective on fishery and mussel management issues and needs, and to help set common goals, objectives, and means of collecting and sharing information. The plan would also help guide conservation efforts for rare or declining interjurisdictional species such as paddlefish and sturgeon and federally listed and candidate aquatic species, and address the Refuge's role in commercial harvest of species and control of aquatic invasive species. Healthy fishery and mussel populations also benefit the public's use and enjoyment of these resources.

Strategies

1. Add a fishery biologist to the Headquarters staff to coordinate fishery and mussel management on the Refuge.
2. Take an active role in Upper Mississippi River Conservation Committee fisheries technical section and mussel ad hoc committee.
3. Prepare plan in collaboration with the states, Service fishery offices, the Genoa National Fish Hatchery, and aquatic biologists of the U.S. Geological Survey.

Objective 3.7: Commercial Fishing and Clamming.

By the end of 2008, complete a Fishery and Mussel Management Plan, and by January 2010, have a mechanism or agreements in place to ensure that Refuge System permit requirements are incorporated in state-issued permits.

Rationale: The Refuge has provided little to no oversight of the commercial harvest of fish or mussels in the past since most fish and mussel management falls under the primary jurisdiction of the states. However, federal regulations governing the Refuge System state that "fishery resources of commercial importance on wildlife refuge areas may be taken under permit in accordance with federal and state law and regulations" (50 Code of Federal Regulations, Part 31.13). Other regulations govern all commercial uses on refuges. Besides this compliance issue, the Refuge can play an important advisory and coordination role with the four states which administer commercial fish and mussel harvest on the Refuge. A Fishery and Mussel Management Plan is needed before any Refuge-specific stipulations for consideration and use in state permits could be crafted.

Strategies

1. In addition to the strategies in Objective 3.6, establish, with the states through the Upper Mississippi River Conservation Committee, a method of sharing permittee and catch information for the Refuge.
2. Devise a Refuge permitting process that dovetails with state permits so that commercial users need only one permit or license versus two.
3. Enter into cooperative agreements as needed to implement this one-stop-shopping permit process.
4. Ensure that commercial harvest of fish and mussels meets objectives in Refuge plans, and explore ways that commercial harvest can help address invasive species issues (Objective 2.4).
5. Ensure consistency with state regulations whenever possible. For instance, the Refuge would not issue permits for mussel or fish harvest in areas not opened by the states.

Objective 3.8: Turtle Management.

By spring 2008, initiate a 3- to 5-year turtle ecology study on representative habitats of the entire Refuge. Continue to cooperate with the

states, U.S. Geological Survey, and the Corps of Engineers in monitoring turtle populations on certain Refuge areas.

Rationale: Recent surveys in the Weaver Bottoms area of Pool 5 indicate that this area of the Refuge is an important, and perhaps critical, area for eight species of turtles, some of which are listed by the states as threatened or endangered. Surveys on other Pools of the Refuge show that 11 species are present. There are numerous potential negative and positive impacts to turtles from public use and navigation channel maintenance activities on the Refuge. However, more rigorous monitoring and research is needed over a broad area to understand turtle populations and ecology. This information would then guide a coordinated approach to their conservation, and guide management decisions concerning public uses in or on important turtle habitats.

Strategies

1. In cooperation with the U.S. Geological Survey, seek special funding and grants to fund the turtle ecology study.
2. Continue to coordinate with the Corps of Engineers and the states on ways to minimize turtle nesting disturbance on dredge material placement sites located on the Refuge.
3. Through the Upper Mississippi River Conservation Committee, devise a method of sharing more detailed commercial turtle harvest information for the Refuge.
4. Upon completion of the turtle ecology study, complete a turtle management strategy and incorporate recommendations in habitat, commercial use, and public use management activities.
5. Conduct public information effort including media, brochures, signage, and programs to increase awareness and appreciation of turtles and communicate what visitors can do to minimize impacts on beach areas used for nesting.

Objective 3.9: Forest Management.

Complete by the end of 2008, in cooperation with the Corps of Engineers, a forest inventory of the Refuge, and by 2010, complete a Forest Management Plan for the Refuge.

Rationale: A baseline forest inventory of the approximately 51,000 acres of floodplain forest on the Refuge is the first step in addressing concerns for the long-term health of this important resource. The Corps of Engineers has been actively working on a forest inventory for several years on Corps-acquired lands, and it makes fiscal and efficiency sense to partner with the Corps of Engineers on Service-acquired lands on this objective. A Forest Management Plan is needed to integrate forest and wildlife objectives, and to identify management prescriptions such as harvest, planting, fire, and invasives control. Collaboration with the Corps of Engineers is essential to meet the forest habitat needs of wildlife since the Corps of Engineers retained forest management authority on Corps of Engineers-acquired lands that are part of the Refuge. Healthy forests also benefit the diversity and quality of public uses on the Refuge.

Strategies

1. Support a balanced forest management approach that provides adequate habitat for cavity nesting species, and ensures retention of a closed canopy for forest birds of management concern such as Red-shouldered Hawks and Cerulean Warblers.
2. As Refuge funding allows, continue to fund seasonal technicians to help with the Corps of Engineers' inventory project on Service-acquired lands. Seek ways to leverage funds through partners or grants for long-term forestry technicians.
3. Continue to work with the Corps of Engineers and other partners on forest rejuvenation and research projects.
4. Continue small scale reforestation, especially mast-producing hardwoods, on suitable Refuge lands.

5. Add a Refuge Forester to the Headquarters staff to oversee Forest Management Plan preparation and implementation, and to coordinate with the Corps of Engineers and the states on forest management issues and opportunities.

Objective 3.10: Grassland Management.

Maintain 5,700 acres of grassland habitat on the Refuge through the use of various management tools including prescribed fire, haying, grazing, and control of invasive plants. Address grassland conservation and enhancement in a step-down Habitat Management Plan.

Rationale: Many species of wildlife, particularly birds, are dependent on grassland habitat. In addition, some of these grasslands are remnant tallgrass native prairie, a diverse and rare ecosystem throughout the Midwest and home to rare or declining plant and animal species. Some grasslands within or near the Refuge are a unique and declining type of prairie, called sand or xeric prairie, which developed on porous and dry sand terraces created adjacent to the Mississippi River thousands of years ago. Active management is needed to curb loss of grasslands to forest succession or invasive species, and to maintain species diversity and health. In some areas near the river, there are opportunities to restore sand prairie. Healthy grasslands benefit a variety of public uses including wildlife observation, plant study, photography, and hunting.

Strategies

1. When completing the Habitat Management Plan, look at feasibility of increasing grassland areas on the Refuge due to its importance to grassland nesting birds and other wildlife.
2. Continue efforts with local units of government, other agencies, and private conservation groups to restore sand prairie on the Brice Prairie area (La Crosse County).
3. Implement the Refuge's Fire Management Plan.
4. Use haying, rotational grazing, and control of invasive plants as appropriate to maintain grasslands. Restore aspects of native prairie where feasible using a combination of rest, fire, farming, and reseeding as appropriate to the site.
5. Increase monitoring to measure effectiveness of treatments.

Goal 4: Wildlife-Dependent Recreation.

We will manage programs and facilities to ensure abundant and sustainable hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education opportunities for a broad cross-section of the public.

Objective 4.1: General Hunting.

Maintain a minimum of 187,102 acres (78 percent)[3] of land and water of the Refuge open to all hunting in accordance with respective state seasons, and add four new administrative No Hunting Zones totaling 505 acres. See related Objective 4.2 on Waterfowl Closed Areas. (See Table 2 on page 187 of Appendix C and maps in Appendix E.)

Rationale: Maintaining a large percentage of the Refuge open to hunting is in keeping with guidance in the Refuge Improvement Act to facilitate wildlife-dependent use when compatible. This objective also represents an integrated wildlife and public use emphasis by more strategic placement of Waterfowl Closed Areas in the related Objective 4.2, to both protect migrating waterfowl and offer a better distribution of waterfowl hunting opportunities. These Closed Areas reopen to some hunting after the duck season, adding to the open acreage above. The four new No Hunting Zones are for safety reasons or to minimize conflict between user groups. One is at Buffalo River in Pool 4 (215 acres) to address public safety concerns along Highway 35, another is at Sturgeon Slough, Pool 10 (66 acres), which contains a fairly new hiking trail off a major highway, another is at Crooked Slough proper, Pool 13 (192 acres) to avoid conflicts and address safety concerns in a relatively narrow corridor popular with anglers, and the fourth is around the Goetz Island Trail, Pool 11 (32

3. This acreage and percent is designed as a benchmark to denote the importance of hunting on the Refuge due to long-standing tradition and in compliance with the intent of the Refuge Improvement Act and Service policy. Although technically correct, these numbers must be tempered by existing habitat conditions and varying state hunting laws which can make some areas being open a moot point. For example, open water areas may be "open" to hunting, but since some states preclude open water hunting of waterfowl, many areas may not provide opportunity. These opportunities are also subject to fluctuation due to increases or decreases in emergent vegetation which often defines "open water," or, construction of islands as part of habitat projects which may "open" opportunities to hunt an area. However, the overall acreage helps express the long-term intent of the Refuge to ensure abundant hunting opportunities.

acres) which connects to a trail in the City of Guttenberg, already a no hunting area by city ordinance.

Strategies

1. Continue yearly review of Refuge Hunting Regulations to ensure clarity and to address any emerging issues or concerns, and give the public an opportunity to review and comment on any changes.
2. To minimize potential conflicts between user groups, no hunting should occur on the Refuge from March 16 to August 31 of each year, except for spring Wild Turkey hunting and, on the Illinois portion of Refuge, squirrel hunting. The Refuge will address this change in future updates to the Refuge Hunting Plan.
3. Work cooperatively with the Town of Shelby, La Crosse County, Wisconsin DNR, and the Corps of Engineers to facilitate deer hunting on Goose Island, Pool 8, to address a high deer population and related safety, disease, and habitat degradation concerns.
4. Continue to publish the Refuge Hunting Regulations brochure to inform the public of hunting opportunities and Refuge-specific regulations.
5. Continue to improve the hunting experience by ongoing improvements to habitat and enforcement of regulations.
6. Review the 1989 Refuge Hunting Plan and modify as needed by January 2007 to comply with new regulations and policies.
7. Clearly sign areas closed to hunting and ensure public notification through news releases and other means well before the hunting seasons. Do the same for hiking trails that remain open to hunting.

Objective 4.2: Waterfowl Hunting Closed Areas.

In fall 2007 (fall 2009 for Pool 4 changes), implement the following changes to the current Waterfowl Hunting Closed Area system on the Refuge:

Add eight new Closed Areas/Sanctuaries and delete or modify some of the current 15, for a total of 23 units totaling 43,652 acres, or 995 acres less than current area (see Table 3 on page 188 in Appendix C and maps in Appendix E.

The following areas would be closed to all entry and use from October 1 to the end of the respective state regular duck season (sanctuary status, 5,050 acres total):

a) Pool Slough Sanctuary (McGregor District, Pool 9, Iowa/Minnesota, 1,112 acres)

b) Guttenberg Ponds portion of the 12 Mile Slough Closed Area (McGregor District, Pool 11, Iowa, 252 acres)

c) Spring Lake Sanctuary (Savanna District, Pool 13, Illinois, existing sanctuary, 3,686 acres)

Use regulations or guidelines for Closed Areas would be as follows: The public will be asked to practice Voluntary Avoidance (limiting entry) on all closed areas October 15 to the end of the respective state duck hunting season. In addition, there will be a "no motor" restriction on small closed areas October 15 to the end of the regular state duck hunting season. Large closed areas are greater than 1,000 acres and small closed areas are ~1,000 acres or less. "No motors" means the use of motors on watercraft is not allowed, although possession of motors is allowed. Exceptions are:

a) The existing Lake Onalaska Closed Area. Pool 7, Wisconsin, and associated Voluntary Waterfowl Avoidance Area would not be affected, although boundary adjustments would be made to the Closed Area as shown on the map for Pool 7.

b) The existing Bertom/McCartney Closed Area, Pool 11, Wisconsin, retains current entry and use regulations (no change).

Implement the following policy for more restrictive use regulations: The Refuge will monitor human disturbance in closed areas, and if disturbance exceeds a threshold, the Refuge will, in coordination with other agencies, move to implement more restrictive regulations such as no motors, no fishing or no entry on an individual closed area basis. Human disturbance monitoring and research on Pools 7 and 8 suggests a reasonable threshold of one major disturbance per day based on a season-long average. A major disturbance is defined as a human intrusion which displaces 1,000 waterfowl or 50 percent of the waterfowl present, whichever is less. The disturbance threshold would not include

commercial fishing (handled through permitting process) or government entities engaged in monitoring, research, or law enforcement.

Implement the following policy for approving fish habitat improvements in closed areas through EMP or other programs: Project proposals will be evaluated on a case-by-case basis considering factors which influence human intrusion and waterfowl disturbance such as size of area, boundary configurations, visual barriers, species and numbers of waterfowl, public access points, public use patterns, and proximity to population centers and other recreation facilities. Evaluations will be conducted in collaboration with the states and Corps of Engineers.

Rationale: This objective represents a balanced approach between the needs of waterfowl and the public as reflected in the following overall Closed Area system goals:

Provide migrating waterfowl a more balanced and effective network of feeding and resting areas.

Minimize disturbance to feeding and resting waterfowl in closed areas.

Provide waterfowl hunters with more equitable hunting opportunities over the length of the Refuge.

Reduce hunter competition and waterfowl crippling loss along some closed area boundaries.

Stabilize boundaries, to the extent practicable, where island and/or shoreline loss or gain creates a fluctuating boundary.

This objective also helps address the issues surrounding Closed Areas as discussed in Chapter 1. The new Closed Areas were chosen to fill gaps between existing Closed Areas, to meet the needs of both dabbler and diver ducks which have different spatial and foraging needs, and to provide areas with the best food potential. An analysis of the potential carrying capacity of existing and proposed alternative Closed Areas was completed in 2004 and is available at Refuge headquarters or on the Refuge planning web site (http://midwest.fws.gov/planning/uppermiss).

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The Closed Area locations and configurations in this objective also took into account the need for public access and travel routes, commercial navigation, adjacent business and community needs and practicalities, likelihood of near-term habitat improvements in existing Closed Areas, and the desire to continue to provide viable waterfowl hunting opportunities.

Relatively large and small closed areas were treated differently since they generally cater to different waterfowl species groups (divers versus dabblers), differ in carrying capacity of birds, and reflect differences in effects of human entry due to size of area and the natural visual or noise barriers present. Human entry in a small closed area will often disturb nearly all the birds present, forcing them to other parts of the Refuge or beyond. Human entry in large closed areas may be variable, from little to no disturbance based on where birds are located, to moving some birds to other portions of the closed area, to moving virtually all birds present from the closed area. The effective date of October 15 for entry and use regulations reflects public concern about the loss of fall fishing opportunities and survey data which shows that the major influx of waterfowl occurs after October 15 each year.

The new policy on setting a threshold of disturbance to guide future entry and use regulation decisions was based on state and public comments. However, given the food and rest needs of waterfowl on migration, it is recognized that no human disturbance is optimum. Thus, the disturbance rate of one major disturbance per day is not intended to represent a purely biologically-accepted threshold of disturbance, but a balance between the needs of waterfowl and the realities of a large open river system, various authorities, different user groups, abundant

access points, and the level of surrounding development.

No change was made in entry regulations for the Lake Onalaska closed area to provide a benchmark for measuring long-term voluntary avoidance effectiveness and compliance as presented in the existing Lake Onalaska Voluntary Avoidance Area. The exception also recognizes the unique location of the Lake Onalaska closed area amidst heavy shoreline development and the resulting heavy watercraft use needs and patterns by adjacent property owners and nearby population centers. The Bertom/McCartney exception recognizes use patterns resulting from the existing boat landing in the heart of the area and existing fall fishing levels fostered by an earlier Environmental Management Program habitat project.

Changes to existing boundaries or new closed areas in Pool 4 (Nelson-Trevino, Big Lake, Peterson Lake, and Rieck's Lake/Buffalo River) will not take effect until the 2009 waterfowl hunting season. During public meetings and workshops, hunters raised questions about the level of waterfowl use in the existing Nelson-Trevino Closed Area. Since this area is heavily wooded, it is not feasible to get an accurate index of waterfowl use during fall aerial surveys. Thus, the Refuge will implement on-the-ground monitoring for three years to ascertain bird use numbers and patterns in the Nelson-Trevino and surrounding areas. Based on the results of this monitoring, the Refuge will have a better picture of waterfowl use dynamics in the Pool 4 area. The changes presented in this alternative will proceed in 2009 unless data dictates another course. The public will be kept informed of the monitoring and any resulting changes in management direction.

The new paired closed areas in Pool 10 (Wisconsin River Delta and Sturgeon Slough/McGregor Lake) has a standard, small closed area at Sturgeon Slough which protects bird use in the best habitat. The McGregor Lake portion was dropped from any closed area designation due to marginal waterfowl habitat and its importance to sport fishing. The Wisconsin River Delta was renamed a special hunt area to better reflect the nature of the less-restrictive regulations being employed (closed to hunting and trapping, voluntary avoidance, November 1 to the end of the duck season only). (See Table 5 in Appendix C, and maps in Appendix E.)

Finally, the policy on evaluating proposed fish habitat improvements in closed areas recognizes the need to address unintended conflicts that may arise when trying to meet different objectives for fish and waterfowl in the same area. Fall fishing has been shown to be a major disturbance to waterfowl in some closed areas. Certain fish habitat improvements which attract and hold fish can increase angler use and waterfowl disturbance, and on small closed areas especially, have the potential to negate any waterfowl migration benefits. Careful consideration of these dynamics is needed when planning habitat projects.

Strategies

1. Continue to improve habitat in all Closed Areas by ongoing programs such as pool-wide drawdowns, Environmental Management Program projects, and other agency initiatives and regulations.
2. Continue to monitor waterfowl use of Closed Areas through weekly aerial surveys in the fall and adjust closed areas as needed in a more adaptive manner and with full agency and public involvement.
3. Monitor the frequency and effect of disturbance by the public in line with the disturbance threshold policy.
4. Meet with Wisconsin DNR and other states to develop criteria to be used in evaluating the compatibility of fish habitat improvements in Waterfowl Hunting Closed Areas located in Wisconsin.
5. Conduct a comprehensive public information campaign to inform waterfowl hunters and the general public of impending changes. Use all methods available including personal contact, presentations at organizations, special meetings, leaflets, maps, signing, news releases, websites, and media interviews.
6. Develop new signs for the differing regulations/guidelines for large and small closed areas and post boundaries of new or modified closed areas well in advance of the waterfowl hunting season to help with public awareness.
7. Increase law enforcement presence to help ensure understanding and compliance with changes, relying on verbal and/or written warnings, at an officer's discretion, the first year of implementation in 2007.

Objective 4.3: Waterfowl Hunting Regulation Changes.

In fall 2007, implement the following Refuge-specific waterfowl hunting regulation change: Open-water waterfowl hunting is prohibited in

Pool 11, approximate river miles 586-592, Grant County, Wisconsin (see map, Appendix E) in accordance with general Wisconsin open-water hunting regulations/definitions. No change to other Refuge waterfowl hunting regulations, except for permanent blinds and decoys in the Savanna District, Objective 4.5 (See Appendix I of the final EIS/CCP for current Refuge regulations). A summary of Wisconsin's open water regulation is:

No person may hunt waterfowl in open water from, or with the aid of, any blind including any boat, canoe, raft, contrivance, or similar device. Open water is defined as any water beyond a natural growth of vegetation rooted to the bottom and extending above the water surface of such height as to offer whole or partial concealment to the hunter. Dead stumps and dead trees in the water do not constitute a natural growth of vegetation. Hunting is permitted in any open water area provided the hunter is standing on the bottom without the aid of a blind. Blinds include, but are not limited to, any boat, canoe, raft, or similar device that provides any concealment for the hunter.

Rationale: The prohibition of open-water hunting is to limit disturbance in an area of Pool 11 that has become an important feeding and loafing site for thousands of Canvasback and Lesser Scaup ducks, two species of management concern due to relatively small or declining populations. In Pool 11, Grant County, open water hunting is allowed through a special exemption to the Wisconsin regulations. In the 1980s, the area was an important staging and feeding area for diving ducks, primarily Lesser Scaup, which fed on abundant fingernail clams. When the fingernail clam population collapsed, waterfowl use virtually ceased. In recent years, wild celery has become partially re-established and the area is attracting increased numbers of Canvasback and other diving ducks. This area provides the only major staging and feeding area for divers between Pool 9 and Pool 13, a distance of 125 river miles. This objective represents a scaling-back of proposals in earlier alternatives based on public input, and to ensure the action targets the current area of need versus a broad, preemptive approach. However, an additional strategy below highlights the Refuge's continued concern with periodic suggestions by individuals/groups to liberalize open-water hunting regulations.

The proposed shotshell possession limits and hunting party spacing requirement were dropped based on input from a majority of waterfowl hunters providing comment, issues with enforcement and compliance, and desire of Illinois waterfowlers to retain the 200-yard spacing requirement in Pools 12-14. In lieu of specific regulation, the strategies below have been modified to reflect the continuing need for information and education to help reduce hunter crowding, skybusting (shooting at birds out of range) and resulting crippling loss, conflicts between parties, and litter in the form of spent shells.

Strategies

1. Conduct a comprehensive public information campaign to inform waterfowl hunters and the general public of impending regulation change. Use all methods available including personal contact, presentations at organizations, special meetings, leaflets, signing, news releases, websites, and media interviews.
2. In cooperation with waterfowl hunters and conservation organizations, develop a hunter information and education campaign starting in fall 2007 to help address the issues of crowding, conflicts, skybusting (shooting at birds out-of-range) and bird retrieval, and spent shell litter to maintain the quality and important traditions of waterfowl hunting on the Refuge.
3. Maintain or improve habitat in Pool 11 through ongoing programs such as pool drawdowns, habitat enhancement projects, and other agency initiatives and regulations.
4. Continue to monitor waterfowl use of Pool 11 through weekly aerial surveys in the fall.
5. Continue to work with the states to help ensure that state waterfowl regulations concerning open water hunting continue to safeguard important diver duck staging areas in Pool 9 and elsewhere, and add additional Refuge-specific open-water hunting regulations only if warranted.

Objective 4.4: Firing Line – Pool 7, Lake Onalaska.

By October 1, 2006, in cooperation with local waterfowlers and state managers and conservation officers, complete a step-down plan for the Gibbs Lake area of Pool 7 (see map, Appendix E). The plan should strive to address the following goals:

Reduce competition and conflict in securing preferred hunting sites.

Reduce pre-emptive use of choice hunting sites.

Reduce crowding.

Reduce skybusting (shooting at birds out-of-range) and resulting crippling or loss of downed birds.

Improve the quality of the waterfowling experience.

Be fair, simple, and efficient to administer and manage.

Rationale: A purpose of the Refuge's Closed Area System is to disperse waterfowl hunting opportunities since hunters tend to congregate near concentrations of waterfowl. However, some sections of closed area boundaries, particularly those that bisect emergent marsh at the upriver end of the Lake Onalaska Closed Area (Gibb's Lake), can attract large concentrations of hunters in firing lines as they wait for waterfowl to leave closed areas. Pass shooting is the technique most often used, particularly in the Barrel Blinds area of Gibb's Lake. Unfortunately, "skybusting," or shooting at birds out of range, is common and often results in increased crippling loss. For example, during the 1991-93 seasons, officers observed that 63 of 141 hunting parties (44.7 percent) along firing lines in Pool 7 skybusted at least once during the time they were observed. Skybusting was defined as shooting at waterfowl at distances of 50 yards or more. The number of shots required to retrieve one bird was 11. During the 1992 hunting season, these same observers working Pool 7 firing lines and other areas found that hunters who did not skybust had a crippling loss rate of about 27 percent for the ducks or coots they downed. The crippling loss rate for ducks and coots downed through skybusting increased to nearly 57 percent.

Hunter behavior can also deteriorate in crowded, competitive situations. Behavior observed or reported along the Barrel Blinds area includes people claiming preferred sites (spending the night, leaving illuminated lights in unattended sites, handing-off sites to friends or co-workers after a party's hunt is over), engaging in verbal confrontations, late arriving hunters disrupting those set-up, flaring birds before they can work decoy sets, failure to retrieve birds, and increased littering.

Guidance in the Refuge Manual helps set the standard for hunting on refuges:

> "Refuge hunting programs should be planned, supervised, conducted, and evaluated to promote positive hunting values and hunter ethics such as fair chase and sportsmanship. In general, hunting on refuges should be superior to that available on other public or private lands and should provide participants with reasonable harvest opportunities, uncrowded conditions, fewer conflicts between hunters, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport. This may require zoning the hunt unit and limiting the number of participants."[4]

The Refuge looked at several options for improving the hunting experience in the Gibbs Lake area. These options included limiting the number of hunters pool-wide, setting minimum distances between hunters, more education, limiting the number of shotshells, more intense enforcement, and modifying the closed area boundary. These options all had shortcomings in this particular area compared to a managed hunt program. However, based on concerns with a managed hunt, it was deemed appropriate to re-engage waterfowl hunters in trying to address their concerns while at the same time meeting the Refuge's goals for the Gibbs Lake area.

Strategies

1. Assemble a diverse group of waterfowl hunters familiar with the Gibbs Lake Area, and

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4. This guidance was superceded late in the planning process by new policy on hunting released June 26, 2006. The new guidance is summarized in Appendix G.

Wisconsin DNR biologists/managers and conservation officers, to provide input to the Refuge for preparing a draft Gibbs Lake Waterfowl Hunting Management Plan that meets the goals above.

2. Ensure opportunity for public review and comment on the draft management plan.
3. Conduct a comprehensive public information and education effort to inform waterfowl hunters of any changes resulting from the planning effort. Use personal contact, presentations, special meetings, leaflets, signing, news releases, websites, and media interviews as applicable.

Objective 4.5: Permanent Hunting Blinds on Savanna District.

Phase-out the use of permanent hunting blinds for waterfowl hunting and the practice of leaving decoy sets overnight within the Savanna District of the Refuge. Permanent blinds and leaving decoys out one-half hour after shooting hours will no longer be allowed on the Refuge in Pool 12 after the 2006-07 season, Pool 14 after the 2007-08 season, and Pool 13 after the 2008-09 season.

Rationale: Eliminating permanent blinds would provide consistency on the Refuge since they are not allowed on the other three Districts. In addition to consistency, eliminating the blinds would address a host of issues involving debris, private exclusive use of public waters, limiting hunting opportunities, and confrontations and other incidents. These issues are discussed more fully in Chapter 1. This objective would also reduce the staff time spent on law enforcement, complaints, and clean-up that permanent blinds entail, time that could be directed toward more wildlife-related needs, and in line with the wildlife aspect of this alternative. By using a phased approach, the objective takes into consideration the long-standing tradition of permanent blind hunting and gives hunters more time to transition to alternative hunting methods and areas. The phase out schedule will give the greatest number of hunters more time to adjust, and takes into account staff workload by timing the phase out over three years. The elimination of permanent blinds also opens the Refuge to a broader cross-section of hunters, and will help reduce conflict that has arisen between hunting parties, and limits the private, exclusive use of public waters and lands.

Related to permanent blinds is the issue of leaving duck hunting decoys on Refuge waters in Pools 12-14 (Savanna District). This is an exception to Refuge-wide regulations which state that decoys may not be in place ½ hour after the close of legal shooting hours and 1 hour before the start of legal shooting hours. Hunters who leave decoys out overnight, and in some instances multiple days or the entire season, are in effect practicing private, exclusive or proprietary use of public waters by tying-up a hunting area. Like permanent blinds, this has the effect of limiting places for the general public to hunt.

Strategies

1. Conduct a public information campaign to inform hunters of the changes, and to give hunters ample time to adjust to alternative hunting methods or areas.
2. Prepare and distribute a leaflet explaining the new regulations governing temporary blinds and decoy use.
3. Begin phase in of permanent blind regulations by requiring hunters to comply with the following requirements the year before a respective pool is scheduled for permanent-blind phase-out:
   a) Blinds must be marked with name, address, and telephone number of owner.
   b) All blinds and blind material within 100 yards of blind site must be removed by the hunter within 30 days of the end of the waterfowl hunting season.

Objective 4.6: Potter's Marsh Managed Hunt on Savanna District, Pool 13.

Beginning with the 2006-07 season, implement a variety of administrative and regulation changes to reduce costs and provide an equitable hunting experience. Permanent blinds would be eliminated after the 2008-09 season (Pool 13 schedule), but boat-blind sites provided and managed.

Rationale: This objective reflects an integrated approach by reducing costs and staff time that can be devoted to wildlife objectives, while retaining the essence of the waterfowl hunt which provides a desired experience for hunters. The changes would reduce problems associated with permanent blinds as noted in Objective 4.5 (debris, private exclusive use, limiting hunting opportunities, and confrontations) and reduce the administrative costs associated with the drawings, permit administration, and

oversight of the current program (see the issue discussion in Chapter 1).

Strategies

1. Implement the following for the 2006 waterfowl hunting season:
   a) The Refuge will mark with numbered stakes 49 hunting areas (same number as current); blinds must be set up within 25 feet of stake.
   b) Blind sites must be occupied one-half hour prior to shooting time or they will be open to the public first-come, first-served.
   c) A 400-yard closed area restriction on the west boundary of Potter's Marsh will be maintained (491 acres) to prevent encroachment from other public hunting.
2. Implement the following regulation changes for the 2009 season:
   a) Permanent blinds will not be allowed. Only boat blinds in accordance with Refuge temporary-blind regulations.
   b) The Refuge will continue to mark 49 hunting areas and boat blinds must be set up within 25 feet of stake.
3. Implement the following application and drawing procedure changes for the 2006 season:
   a) Accept applications and hold drawing for blind area on same day, generally on a Saturday in July coinciding with the northwest region of Illinois Department of Natural Resources managed hunt drawing .
   b) Applicant must be present at drawing.
   c) Applicant must have current Firearm Owners Identification if Illinois resident, and current year license and state and federal duck stamps.
   d) Applicants must be 16 years of age by date of drawing.
   e) Applications accepted 10 a.m. to 2 p.m. with drawing at 2 p.m.
   f) The successful applicant receives boat-blind site for entire season.
   g) Application fee $10, plus $100 fee for successful applicants.

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4. Conduct public information campaign to inform the public of the change and to give hunters who have become accustomed to the former managed hunt a chance to adapt to alternative hunting methods or areas.

Objective 4.7: Blanding Landing Managed Hunt, Pool 12.

After the 2006-07 season, eliminate the managed waterfowl hunt at Blanding Landing, Lost Mound Unit, Savanna District (former Savanna Army Depot), including the use of permanent blinds, and open the area to waterfowl hunting on a first-come, first-secured basis.

Rationale: The Illinois Department of Natural Resources administers this hunt on behalf of the Savanna Army Depot, but with transfer of jurisdiction to the Service, hunting on this area is now the responsibility of the Refuge. Similar to the Potter's Marsh Managed Hunt above, this objective would reduce problems associated with permanent blinds as noted in Objective 4.5 (debris, private exclusive use, limiting hunting opportunities, and confrontations) and eliminate the administrative costs associated with the drawings, permit administration, and oversight of the current program. This objective reflects a wildlife emphasis since funding and staff currently devoted to this hunt could be focused on wildlife objectives throughout the Savanna District, and especially the new Lost Mound Unit which has large start-up needs. This objective also reflects a public use emphasis by opening an area to a larger number of waterfowl hunters.

Strategies

1. Conduct a public information campaign prior to implementation to inform the public of the change and give hunters accustomed to the

managed hunt a chance to adapt to alternative hunting methods or areas.

Objective 4.8: General Fishing.

Provide and enhance year-round fishing on the approximately 140,000 acres[5] of surface water within the Refuge, and an additional 5,050 acres of waterfowl sanctuaries open spring, summer, and winter. (Note: Iowa, Wisconsin, and Illinois regulations also maintain fish "refuges" below lock and dams 11, 12, and 13, December 1 through March 15). Add five new fishing piers or docks by 2021 for a total of 20 (see Table 24 on page 146).

Rationale: This objective represents the current areas available and open to fishing. Fishing is one of the priority uses of the Refuge System and is to be facilitated when compatible with the purposes of the Refuge and the mission of the Refuge System. Enhanced fishing opportunities are also a reflection of river and Refuge health. The increase in fishing piers or docks is proposed in-line with the integrated public use emphasis of this CCP. These facilities offer fishing opportunities for persons without boats.

Strategies

1. Enhance fishing opportunities on suitable areas of the Refuge through habitat, access, and facility improvements as outlined in other plan objectives.
2. Continue to promote fishing through Fishing Days and other outreach and educational programming.
3. Cooperate with the states in their ongoing fishery management programs.
4. Seek new funding and partnership opportunities to construct the new fishing piers.
5. Ensure yearly inspection and maintenance of all fishing piers to maintain quality and safety.

5. This acreage is designed as a benchmark to denote the importance of fishing on the Refuge due to long-standing tradition and in compliance with the intent of the Refuge Improvement Act and Service policy. Although technically correct, these numbers must be tempered by existing habitat conditions which can affect the quantity of water acres suitable for fishing in any given year. However, the overall acreage helps express the long-term intent of the Refuge to ensure abundant fishing opportunities.

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Objective 4.9: Fishing Tournaments

By January, 2008, in collaboration with the states and the Corps of Engineers through the Upper Mississippi River Conservation Committee, develop a plan for dove-tailing Refuge permitting requirements with the respective state-issued permits for all fishing tournaments occurring on the Refuge.

Rationale: Fishing tournaments continue to grow in size and number on the Mississippi River and on the Refuge. Conflicts can at times occur between tournaments and between tournament participants and the general public due to location, timing, frequency, and size of tournaments. These conflicts can be heightened by differing state and Corps of Engineers policies and permit requirements and stipulations. Care must also be taken to safeguard sensitive habitats or fish and wildlife areas within the Refuge. Since fishing tournaments are a use of the Refuge, they are subject to regulations governing uses on national wildlife refuges.

The Refuge has not provided any oversight to tournaments in the past, deferring to the individual states', and at times Corps of Engineers', regulatory and permitting processes. Although the states will retain their leadership role, the Refuge needs to meet its regulatory requirements for tournaments occurring on the Refuge. This can most efficiently be accomplished by dove-tailing any Refuge requirements in the state permit process and provide one-stop-shopping for tournament clients. Since tournaments often cross state lines regardless of the origin, the Refuge can also serve as a catalyst for an integrated and consistent approach to fishing tournament management on the river.

Strategies

1. Use the Upper Mississippi River Conservation Committee as a forum to discuss with the states and the Corps of Engineers the best strategies for dove-tailing Refuge permit requirements with their permitting procedures.
2. Develop with the states and the Corps of Engineers time, space, and capacity parameters on each Pool within the Refuge, and definitions for what constitutes a fishing tournament.
3. Seek fishing tournament organization input in planning a permit allocation and application process, and ensure opportunity for public involvement and review.
4. Foster the use of a web-based tournament management system so all partners, tournament sponsors, and the public have access to scheduling information, tournament dates, and permit procedures.

Objective 4.10: Wildlife Observation and Photography.

Maintain the following existing and new facilities to foster wildlife observation and photography opportunities: 25 observation decks and areas, 3 observation towers, 4 photography blinds, 14 hiking trails, 19 canoe trails, 6 biking trails, and 3 auto tour routes. (See Table 24 on page 146 and maps in Appendix E.)

Rationale: Wildlife observation and photography are two of the six priority public uses of the Refuge System and are to be facilitated when compatible. This objective represents a marked increase in the number of existing observation decks/areas (plus 10), observation towers (plus 3), photography blinds (plus 4), hiking trails (plus 8), canoe trails (plus 15), biking trails (plus 3), and auto tour routes (plus 2). This expansion of facilities reflects a balanced and measured increase in facilities for wildlife observation and photography, while continuing to meet fish and wildlife protection and management responsibilities.

Strategies

1. Schedule annual inspection and maintenance of the facilities.
2. Ensure adequate signing and information in brochures, websites, and maps so the public is aware of the facilities.
3. Continue to promote the wildlife observation and photography opportunities of the Refuge through public education, outreach, special programs, and partnerships with the states, Corps of Engineers and private conservation groups.
4. Enhance observation and photography opportunities on suitable areas of the Refuge through habitat, access, and facility improvements as outlined in other plan objectives.
5. Seek new funding and partnership opportunities, including volunteers, for construction and maintenance of facilities.

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Objective 4.11: Interpretation and Environmental Education.

By the end of 2010, increase the number of stand-alone interpretive signs to 102 (plus 43) and by 2021 build new district offices with visitor contact facilities at McGregor, Winona, La Crosse, and the Lost Mound Unit. Continue to print and distribute a Refuge General Brochure, and update websites quarterly. Continue to sponsor at least two major annual interpretive events on each Refuge District, and by January 2008 establish at least one major environmental education program at each District with visitor services staff. (See Table 24 on page 146 and maps in Appendix E.)

Rationale: Interpretation and environmental education are two of the six priority public uses of the Refuge System and are to be fostered if compatible with the Refuge purpose and Refuge System mission. Interpreting the resources and challenges of the Refuge to the general public and incorporating these topics into school curricula are important ways to influence the future well-being of the Refuge and the river. Only through understanding and

appreciation will people be moved to personal and collective action to ensure a healthy Refuge for the future. Interpretation and environmental education are also key to changing attitudes and behavior which affect the Refuge through off-Refuge land use decisions and on-Refuge conduct and use.

This objective reflects a marked increase in interpretation and environmental education capability and programs and reflects the importance of these programs in an integrated resource management alternative. It also reflects basic needs for a Refuge that is the most heavily visited in the United States, and would provide facilities necessary to inform and educate visitors and help them make the most of their Refuge visit. Since environmental education is curriculum-based and labor intensive, initial efforts will be limited to Districts with public use staff, but will increase across all Districts if and when staff are added.

Strategies

1. Hire visitor services specialists at McGregor and Winona Districts (top priority), and hire a visitor services specialist to be stationed at the National Mississippi River Museum in Dubuque, Iowa, to help present Refuge-specific programs.
2. Continue work to complete exhibits at Savanna and La Crosse offices, and seek funding to replace exhibits at McGregor District and the Lost Mound Unit of the Savanna District.
3. Participate in national interpretive events such as National Wildlife Refuge Week or Migratory Bird Day for efficiency and effectiveness.
4. Conduct a quarterly condition review of interpretive signs and complete maintenance and sign replacement as needed.
5. Cooperate with existing interpretive and environmental education programs offered by the states, Corps of Engineers, other agencies and private conservation groups, and continue to seek grants to fund events and programs.
6. Continue to place interpretive signs at public access and overlook points in cooperation with various agencies and units of government.

Objective 4.12: Commercial Fish Floats.

By the end of 2006, develop new facility, operations, and concession fee standards for the four existing commercial fish floats or fishing piers below Locks and Dams 6, 7, 8, and 9. Phase out those operations which do not meet new standards, solicit proposals for new floats, and base a decision on the adequacy and feasibility of the new proposals.

Rationale: This objective would continue to recognize the important role of fish floats in providing an alternative fishing experience for a diversity of Refuge visitors. However, new standards would address several long standing management issues such as permit non-compliance, condition and safety issues with some operations, net economic loss to the government, and noncompliance with regulations governing concessions on national wildlife refuges. Phasing out operations not in compliance would reduce Refuge administrative and staff costs, resources that could be directed back to fish- and-wildlife-related objectives. Soliciting new proposals to replace any facilities phased out could lead to quality replacements to meet need and demand while reducing staff oversight.

Strategies

1. Seek input from current fish float owners, draft new standards well in advance of implementation, and give fish float owners/operators a chance to review and comment.
2. Continue yearly coordination meeting with float owners and operators to address concerns and permit conditions.
3. Continue enforcement of permit stipulations and suspend permits of those operations not meeting the stipulations.
4. Inspect facilities for safety at least once yearly.
5. If any floats are phased out due to non-compliance with permit stipulations, ensure adequate public notice so clients can seek alternate opportunities and ensure timely solicitations of new float proposals.

Objective 4.13: Guiding Services.

In collaboration with the states and the Corps of Engineers, implement in spring 2008, a consistent process for issuing permits for persons conducting for-hire guided hunting, fishing, and wildlife observation activities on the Refuge.

Rationale: As noted in the issues section of Chapter 1, guiding businesses are on the rise and promise to become an increasingly common activity on the Refuge. Without proper oversight, this activity could lead to disturbance to sensitive areas and wildlife, and increased conflict with the general public or other guides as volume and frequency increases. In addition, guiding and other commercial uses are prohibited on a national wildlife refuge unless specifically authorized via permit. The Refuge needs to bring this use into compliance with regulations and policy. Effectively managing this use would not only safeguard fish and wildlife resources, but also benefit the general public that uses the Refuge for hunting, fishing, and wildlife observation, and thus represents an integrated approach.

Strategies

1. Use the Upper Mississippi River Conservation Committee as a forum to discuss with the states and the Corps of Engineers the best strategies for dove-tailing Refuge permit requirements with their permitting procedures.
2. Develop with the states and the Corps of Engineers capacity parameters on each Pool(s) within the Refuge for various types of guiding operations. The parameters should aim to minimize competition or conflict with the general public engaged in hunting, fishing, and wildlife observation, minimize conflicts between guides, and ensure a viable economic opportunity for existing guiding businesses.
3. Conduct a public information effort through news releases and media contacts to implement the objective.
4. Provide proactive enforcement through Refuge and other agency law enforcement officers.

Goal 5: Other Recreational Use.

We will provide opportunities for the public to use and enjoy the Refuge for traditional and appropriate non-wildlife-dependent recreation that is compatible with the purpose for which the Refuge was established and the mission of the Refuge System.

Objective 5.1: Beach Use and Maintenance.

Beginning in spring 2007, use the following general guidelines, regulations and policies to manage beach-related uses and beach maintenance. Other existing public use regulations pertaining to beach areas (see Appendix J in the Final EIS/CCP) will remain in effect.

General Guidelines. Beach-related uses will be governed by the following over-arching guidelines:

a) protect human health and safety

b) minimize dangerous situations for Refuge law enforcement officers

c) minimize impacts to wildlife and the Refuge environment.

d) minimize conflicts with wildlife-dependent users

e) set policies and regulations that are reasonable and feasible to administer and enforce

f) minimize or offset current and future administrative, operating, and maintenance costs

g) make regulations easily understood by the general public

Beach Use Policy. Remnant and active dredged material placement sites, natural sand shorelines, and all other shoreline areas within the Refuge will be open to public use and enjoyment in accordance with current and proposed (see item below) Refuge Public Use Regulations. Based on clearly articulated reasons, the Refuge Manager may close or restrict use on certain beach and other shoreline areas to address chronic public use problems or safeguard wildlife or habitat values. Unless an emergency situation, these closures or restrictions will be coordinated with the states and Corps of Engineers

through existing interagency workgroups or through the pool-by-pool beach planning process, and the public will be given proper notice and an opportunity to comment.

New Regulations for Camping and Other Beach-related Uses. Current public use regulations as described in the Refuge Public Use Regulations brochure (see Appendix J in the Final EIS/CCP) will remain in effect, except by April 1, 2007, the following regulation changes will be implemented:

a) Areas open to camping remain unchanged from existing policy and regulations. However, camping is defined as erecting a tent or shelter of natural or synthetic material, preparing a sleeping bag or other bedding material for use, parking of a motor vehicle or mooring or anchoring of a vessel, for the apparent purpose of overnight occupancy, or, occupying or leaving personal property, including boats or other craft, at a site anytime between the hours of 11 p.m. and 3 a.m. on any given day.

b) Human solid waste and associated material must either be removed and properly disposed of off-refuge, or, be buried on site to a depth of 6-8 inches and at least 50 feet from waters edge. The burying of all other refuse, trash, or litter is still prohibited.

c) The use or possession of glass food and beverage containers while afoot on lands within the Refuge is prohibited (vehicles and watercraft are exempt).

d) No change to existing alcohol use regulations as published in the Code of Federal Regulations (50 CFR 27.81 and 32.2) for national wildlife refuges: "Entering or remaining in any national wildlife refuge when under the influence of alcohol, to a degree that may endanger oneself or other persons or property or unreasonably annoy persons in the vicinity, is prohibited" and "The use or possession of alcoholic beverages while hunting is prohibited."

Beach Management and Maintenance Policy. The Refuge will play an active role in completing beach management plans with the Corps of Engineers and the states for all pools within the Refuge, and supports active public involvement in the process. However, the Refuge will in general only concur with maintenance of beaches on remnant dredged material islands or existing dredged material placement sites adjacent to the main channel of the river that are designated "low density recreation" in current Land Use Allocation Plans, or those not otherwise closed to use. Maintenance should be limited to the minimum reshaping, leveling, and vegetation clearing needed to ensure safe access and to facilitate the camping experience. Top dressing with sand should only be done under special circumstances. The scope and extent of all maintenance will be on a site-by-site basis as determined by the respective District Manager in consultation with the Corps of Engineers and the respective state. The Refuge will continue to request the closure of openings to dredged material placement sites after emptying on Service-acquired lands and Corps-acquired lands due to concerns with crowding, large group behavior issues, steep slopes, and shoreline drop-offs. Enforcement of non-wildlife-related recreation in empty placement sites left open on Corps of Engineers-acquired lands will not be the responsibility of the Refuge.

Rationale: Non-wildlife-dependent recreation continues to increase on the Mississippi River and the Refuge. It is estimated that 1.3 million persons per year use the Refuge for camping, recreational boating, picnicking, swimming, social gatherings, and other uses not dependent on the presence of fish and wildlife. This objective, with its new policies and regulations, would help address some of the issues related to beach use described in the issue section of Chapter 1, most notably protection of sensitive wildlife and habitat, human waste, intoxication, unlawful and unruly behavior, officer and public safety, and preemptive use of preferred camping or hunting sites. This objective represents an integrated wildlife and public use approach, using reasonable regulations and policy to ensure that beach-related uses are compatible with the fish, wildlife, and plant conservation purposes of the Refuge and to address public safety concerns. The existing alcohol use regulation was deemed adequate, with the main problem being public awareness of the full regulations versus a set blood alcohol limit. The glass container regulation was added in this alternative since it was suggested by the public at several workshops to address safety problems with broken glass on beach

areas. The beach management and maintenance policy strengthens the Refuge commitment to completing beach management plans in collaboration with other agencies and the public, while communicating the Refuge's preferred policy or framework for completing the plans. This policy also clarifies the Refuge's position on the management of dredged material placement sites and addresses concerns of agency responsibility on areas actively used by the Corps of Engineers for navigation system management.

Strategies

1. Continue to work with the states and the Corps of Engineers through existing interagency workgroups, to complete beach plans for each pool within the Refuge with due consideration of the policies and regulations above. Actively seek public input and comment for beach plan preparation.
2. Conduct a public information and education campaign well before implementation of regulation changes, to include news releases, general articles, fact sheets, and media interviews.
3. Institute an active "Leave No Trace" program for beach users (plan ahead and prepare, travel and camp on durable surfaces, dispose of waste properly, leave what you find, minimize campfire impacts, respect wildlife, and be considerate of others).
4. Explore a citizen "Adopt a Beach" program to help address beach maintenance and clean-up needs.
5. Develop a brochure that clearly explains new policies and regulations and answers frequently asked questions.
6. Refuge law enforcement officers will increase contacts with Refuge users once this plan is approved to explain pending regulation changes. Verbal or written warnings will be used at officer discretion during the first year of implementation to ease the transition.
7. Continue to explore a user fee system to offset costs of beach-related recreation such as camping in line with new fee legislation passed by Congress in 2004. Any fee proposal would be drafted only with full public, state, and Corps of Engineers involvement.

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Objective 5.2: Electric Motor and Slow, No Wake Areas.

Beginning in the spring of 2007, establish a total of five Electric Motor Areas on the Refuge encompassing 1,852 acres, and eight Slow, No Wake Areas encompassing 9,720 acres. The Black River Bottoms Slow, No Wake Area will not be implemented until 2008, and the Nelson-Trevino Slow, No Wake Area in 2009. (See Table 24 on page 146 and Table 4 on page 190 of Appendix C, and see maps in Appendix E.) These areas are defined as follows:

Electric Motor Areas. Areas closed year-round to all motorized vehicles and watercraft except watercraft powered by electric motors or non-motorized means. The possession of other watercraft motors is not prohibited, only their use. For example, anglers could switch to an electric trolling motor when entering these areas.

Slow, No Wake Areas. From March 16 through October 31 in these areas, watercraft must travel at slow, no-wake speed and no airboats or hovercraft are allowed. Respective state definitions for what constitutes "slow, no wake" speed or operation will apply as appropriate. The airboat and hovercraft prohibition refers to operation. For example, they could be propelled by electric motors or other means at slow, no wake speed inside these areas during the dates specified.

Rationale: This objective will help reduce disturbance to backwater fish nurseries and sensitive backwater wildlife such as raptors, Black Terns and other colonial nesting birds, and furbearers in keep-

ing with the wildlife mission of the Refuge. It will also address the need to provide areas of quiet and solitude sought by many users of the Refuge, and thus provide a balanced approach in line with the focus of this CCP. This balancing of needs and desire of user groups, and within user groups, is becoming more important as visitation grows, technology advances, and the use of such technology increases (for example jet skis, mud motors, airboats, and hovercraft). The seasonal prohibition of airboats and hovercraft in the Slow, No Wake Areas recognizes the innate and virtually unavoidable noise levels produced by these types of watercraft. The seasonal approach also allows the use of airboats and hovercraft during the trapping season and for about half of the waterfowl hunting season when it is 60 days or longer. Due to the size and scope of the Refuge, space and time restraints are deemed a fair approach to watercraft use on the Refuge in keeping with the overall goal of providing high quality and sustainable wildlife-dependent recreation and opportunities for other recreation.

All Slow, No Wake Areas will take effect in 2007, except the Black River Bottoms Slow, No Wake Area (Pool 7) which takes effect in 2008, and the Nelson-Trevino Slow, No Wake Area (Pool 4) which takes effect in 2009. During public comment, a group of citizens suggested an alternative Slow, No Wake Area in the Big Marsh/Mud Lake area of Pool 7 to replace the Black River Bottoms area. The proposal had several conditions which made it unsuitable. However, since the proposal has merit based on resource values, ease of access, and existing adjacent facilities, the implementation of the Black River Bottoms Slow, No Wake Area is being delayed one year to allow further exploration of the proposal. However, the Black River Bottoms Slow, No Wake Area will be implemented in 2008 unless further consultation with citizens and a decision by the Refuge Manager dictates another course. The implementation of the Nelson-Trevino Slow, No Wake Area is delayed to 2009 to reduce variables (frequency, type, and level of public use) during three years' of waterfowl monitoring planned for the area. The implementation is related to, and coincides with, Waterfowl Hunting Closed Area changes scheduled for 2009 in Pool 4 (see Objective 4.2, Waterfowl Hunting Closed Areas).

This objective only affects the means of navigation in these areas, and all current uses would be allowed (fishing, hunting, camping, wildlife observation, etc.) in accordance with current regulations or those proposed elsewhere in the CCP.

Strategies

1. Conduct a public information campaign to inform and educate the public about pending area designations and implementation dates. Use news releases, media interviews, fact sheets, brochures, and websites in the information effort.
2. Clearly delineate Electric Motor Areas and Slow, No Wake Areas on Refuge maps and by appropriate signing.

Objective 5.3: Slow, No Wake Zones.

In 2007, begin adding 11 new Refuge-administered slow, no wake zones (brings total to 13) and assist local or other units of government in the enforcement of 44 other slow, no wake zones within the Refuge. In Spring Lake and Crooked Slough-Lost Mound (Pool 13), implement in 2007 a speed and distance restriction similar to state regulations: "Watercraft operators must reduce the speed of their watercraft to less than 5 mph when within 100 feet of another watercraft that is anchored or underway at 5 mph or less." (See Table 24 on page 146 and Table 6 on page 193 in Appendix C.)

Rationale: On a few areas of the Refuge, boat traffic levels and size of boats is leading to erosion of island and shoreline habitat, which can impact fish and wildlife habitat and archeological sites directly or indirectly through increasing sedimentation and water turbidity. On some of the areas identified, slower speeds would reduce safety hazards posed by heavy traffic and blind spots in narrow channels. In the Spring Lake and Crooked Slough areas, the speed and distance regulation will address concerns

of safety and user-conflict without unduly restricting boating use when no other boats are present.

Strategies

1. Work with local authorities to designate and mark slow, no wake zones.
2. Communicate the changes with the public well in advance of implementation using the media and other means, and clearly show slow, no wake zones on maps available to the public.

Objective 5.4: Dog Use Policy.

Beginning March 1, 2007, implement the following new regulation governing dogs on the Refuge:

"No dogs are allowed to disturb or endanger wildlife or people while on the Refuge. All dogs while on the Refuge must be under the control of their owners/handlers at all times or on a leash. No dogs are allowed to roam. All dogs must be on a leash when on hiking trails or other areas so posted. Working a dog in Refuge waters by tossing a retrieval dummy or other object for out-and-back exercise is allowed. However, the above conditions do apply. Dogs are exempt from these conditions while engaged in authorized hunting activities. Owners/handlers of dogs are also responsible for disposal of dog droppings on Refuge public use concentration areas such as trails, sandbars, and boat landings." Field trials or commercial/professional dog training remain prohibited.

Rationale: This objective relaxes the current Refuge System regulation which prohibits unconfined domestic animals on national wildlife refuges. The new regulation provides stipulations for allowing dogs to be free and would allow owners to exercise their dogs, but protects wildlife from disturbance. The new regulation also helps safeguard other visitors from the real or perceived threat that dogs and other animals can pose, but recognizes their traditional use and conservation benefit in hunting. The prohibition of field trials and commercial or organized dog training is a continuation of a long-standing Refuge policy. This regulation also does not affect the existing regulation that prohibits all other unconfined domestic animals on the Refuge.

Strategies

1. Publish the new regulation in the Refuge public use regulation brochure, issue news

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releases, and conduct other outreach prior to implementation in 2007.
2. Except in certain cases, Refuge law enforcement officers will generally give verbal and/or written warnings for violations of the new regulation the first year, then issue violation notices at their discretion beginning in 2008.

Objective 5.5: General Public Use Regulations.

Beginning in 2007, conduct annual review and update of the general public use regulations governing entry and use of the Refuge (current regulations are found in Appendix J in the Final EIS/CCP).

Rationale: Public entry and use regulations not only protect wildlife, but enhance the quality of the visitor experience and thus reflect the integrated focus of this alternative. The current regulations were last reviewed and amended in 1999. However, the resources and public use of the Refuge are dynamic, and a yearly review would ensure that regulations are needed, clear, and effective. In addition, new regulations may be required to safeguard resources or to address new or emerging problems recognized by managers and law enforcement officers. An annual review would provide a more systematic process than in the past.

Strategies

1. Complete a law enforcement step-down plan for the Refuge in cooperation with the states and the Corps of Engineers.
2. Conduct review during Refuge law enforcement meetings.
3. Provide the public, states, and Corps of Engineers ample opportunity to review and comment on any new or substantially changed regulation.
4. Follow national guidance for any changes affecting hunting and fishing and make part of the Code of Federal Regulations governing national wildlife refuges.
5. Update, print, and distribute the Public Use Regulations brochure.
6. Post pertinent regulations at boat landings and other public use areas, such as trail heads and beach areas.
7. Continue proactive law enforcement to inform and educate the public on Refuge regulations and to seek their compliance.

Goal 6: Administration and Operations.

We will seek adequate funding, staffing, and facilities, and improve public awareness and support, to carry out the purposes, vision, goals, and objectives of the Refuge.

Objective 6.1: Office and Shop Facilities.

By 2010, construct new offices and maintenance shops at Winona, La Crosse, and McGregor Districts, and expand the office and construct a new maintenance shop at the Savanna District. Each office would feature a biological work area or lab, and modest public orientation, interpretation and environmental education capability. Refuge Headquarters would be integrated with either the Winona or La Crosse offices. By 2021, remodel or replace the office and shop at the Lost Mound Unit.

Rationale: This objective emphasizes a balanced approach to replacing current office facilities, with a focus on both the resource and public use responsibilities of the Refuge. The expansion of the Savanna District office would be an additional meeting room/classroom for expanded interpretive programs and environmental education.

Strategies

1. Ensure that Refuge office and maintenance needs are reflected in budget needs databases.
2. Work with the Refuge Friends Group to raise private funds for the Savanna expansion.
3. Continue to maintain Service-owned facilities using annual maintenance budget allocations.

Objective 6.2: Public Access Facilities.

By 2021, add one new boat landing (total of 26), four new walk-in accesses, and one improved canoe landing. Improve five parking areas on the Refuge to support public use. (See Table 24 on page 146, maps in Appendix E, and Table 1 on page 185 in Appendix C.)

Rationale: This objective represents a modest increase in public access facilities to help facilitate wildlife-dependent recreational uses. Since the Refuge is mainly a floodplain Refuge bounded by major rail lines and highways, opportunities for increasing access points is limited. In addition to these accesses, there are 221 other public and private boat accesses that provide access to the Mississippi River or its tributaries, and thus the Refuge.

Strategies

1. Continue routine upkeep of boat accesses by Refuge staff, temporary employees and Youth Conservation Corps members when available, and volunteers.
2. Continue to modernize accesses using Maintenance Management System funding or special funding which is provided periodically. Seek design input from users of the accesses.
3. In cooperation with states and local governments, explore Transportation Enhancement Act projects and funding for new accesses and to upgrade current Refuge accesses.

Objective 6.3: Operations and Maintenance Needs.

Complete annual review of Refuge Operating Needs System (RONS), Maintenance Management System (MMS), and Service Assessment and Maintenance Management System (SAMMS) databases to ensure these reflect the balanced funding needs for carrying out this alternative. Continue to document operations and maintenance needs for habitat projects completed on the Refuge through the Environmental Management Program or any future Navigation and Environmental Sustainability

Program administered through the Corps of Engineers.

Rationale: The RONS, MMS, and SAMMS databases are the chief mechanisms for documenting ongoing and special needs for operating and maintaining a national wildlife refuge. These databases are part of the information used in the formulation of budgets at the Washington and Regional levels, and for the allocation of funding to the field. It is important that the databases be updated periodically to reflect the needs of the Refuge, and in particular the objectives and strategies elsewhere in this alternative.

Habitat projects completed through the Environmental Management Program also carry with them an operations and maintenance obligation. For existing projects, this cost amounted to actual Refuge costs of $139,000 in 2003 and $98,600 in 2004. No additional funding is provided by Congress to cover these annual and increasing costs. Estimated annual operations and maintenance costs are expected to grow as projects age, and are projected to average $365,000 per year during the 15-year span of this plan. These costs could accelerate if Congress authorizes and funds the proposed Navigation and Environmental Sustainability Program as documented in the Corps of Engineers 2005 navigation feasibility study.

Strategies

1. Continue to work with partner organizations in disseminating information on operations and maintance needs.

Objective 6.4: Public Information and Awareness.

By 2008, increase by 50 percent the current annual average of 80 media interviews, 125 news releases, and 25 special events (special programs, presentations, and displays at others' events), and by 2021 increase information kiosks to 115, an increase of 49. (See Table 24 on page 146 and maps in Appendix E.)

Rationale: This objective reflects an emphasis on providing the public with more information on both resource-related and public use-related aspects of the Refuge in keeping with a balanced approach. The number of kiosks is high given the size and length of the Refuge, numerous access points, and adjacent National Scenic Byways.

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Strategies

1. Hire visitor services specialists for those Districts without, namely Winona and McGregor Districts.
2. Hire a public information specialist at Headquarters to increase effort on interviews, news releases, and special events.
3. Tap other specialists identified in this alternative (e.g. forester, fishery biologist) for information and outreach on resource programs of the Refuge.
4. Continue to look for creative ways to leverage efforts and funding for public information.
5. Carry out related objectives dealing with trails, leaflets, websites and interpretive signs (see objectives 4.10 and 4.11).
6. Cooperate with the states and the Corps of Engineers on visitor surveys to gauge public awareness of the Refuge and Mississippi River resources.

Objective 6.5: Staffing Needs.

By 2021, increase staffing from current permanent, full-time level of 37 people to 63 people (60.5 full-time equivalents or FTEs) in a full range of disciplines which benefit both resource and public use objectives in this alternative (see Table 7 on page 195 in Appendix C).

Rationale: This objective reflects a balanced approach to Refuge management by providing operations and maintenance-funded staffing deemed necessary to meet the goals and objectives of this alternative. The increase in staff would bring the Refuge just above "minimum staffing levels" used

for planning purposes in the National Wildlife Refuge System. Like all land management, refuge management is labor intensive and labor costs represent over 95 percent of the base operations funding received each year. These staffing needs are documented in the strategies for various objectives in this alternative. Based on public input concerning the need for additional law enforcement capability and presence, an additional four full-time law enforcement officers (one for each of the four Refuge districts) were added. This increase in law enforcement capability is still far below levels recommended in various law enforcement assessments and deployment models for a refuge of this size and visitation level.

Strategies

1. Ensure that staffing needs are incorporated in budget needs databases.
2. Maintain other sources of funding for staff who coordinate the Environmental Management Program and the Partners for Fish and Wildlife Program.
3. Strengthen existing volunteer program and recruit new volunteers to assist with resource management and visitor services.

Table 23: Objective Comparison – Existing and CCP

Issue/Objective	Existing Condition	CCP
Goal 1. Landscape. Improve scenic qualities and wild character of the Upper Mississippi River Refuge.		
1.1 Refuge Boundary	Survey problem areas, post boundary as time permits	In coordination with the Corps of Engineers, identify, survey, and post all areas where threat of encroachment is greatest by 2021.
1.2 Acquisition within approved boundary	Acquire from willing sellers about 200 acres per year or 3,000 acres by 2020. Give highest priority to acquisition of lands and waters most important to fish and wildlife.	Acquire from willing sellers an average of 1,000 acres per year or 15,000 acres by 2020 (58% of goal). Give highest priority to acquisition of lands and waters most important to fish and wildlife, but consider public recreation values.
1.3 Bluffland protection	Low-key current approach: support others and support opportunistic acquisition of some bluff areas in boundary	Acquire from willing sellers 13 bluffland areas within approved boundary (Winona District – 6, La Crosse District – 3, McGregor District – 4). Work with partners to leverage resources, and consider a blend of easements and fee-title acquisition.
1.4 Research Natural Areas and Special Designations	No change, continue low-key monitoring, administration, and public information. No new Natural Areas proposed and no Ramsar designation.	More actively administer Natural Areas; complete management plan for each by 2010 with focus on plant and wildlife conservation. No new Natural Areas proposed. Increase effort to make public aware of values and management of Natural Areas by incoroporating information in brochures, maps, and websites. Nominate the Refuge as a Wetland of International Significance under Ramsar.
Goal 2. Environmental Health. Improve environmental health of the refuge by working with others.		
2.1 Water Quality (chemistry and sediments)	Current program of seeking improvement in water quality and sediment problems through programs of other agencies, including EMP.	Proactive program to address water quality: # private lands biologists # watershed agreements # assessments # research/education # support UMRBA efforts to standardize water quality criteria Address sedimentation in backwaters through EMP and other programs, with emphasis on improving fish and wildlife habitat. Expand strategies, especially for sedimentation, to include U.S. Geological Survey and others. Ensure that fish and wildlife objectives are met while integrating public use needs such as access.
2.2 Water level management	By 2021, complete drawdowns of Refuge pools.	By 2021, complete as many drawdowns of Refuge pools as practicable through the interagency workgroups based on ecological need and engineering feasibility. Access Trust Fund idea included to help fund access work associated with drawdowns.
2.3 Invasive Plants	Continue modest level of control as funding allows.	Complete invasive plant inventory by 2008 and reduce acres affected by 10% by 2010 recognizing that some level of control should continue before and during inventory work.

Table 23: Objective Comparison – Existing and CCP (Continued)

Issue/Objective	Existing Condition	CCP
2.4 Invasive Animals	Continue modest effort of information and education on invasives and their impact.	Increase efforts to control invasive animals through partnerships with the states and other federal agencies, and increase public awareness and prevention. Highlight the seriousness and urgency of the invasive animal threat, especially in regard to asian carp species and the new threat from trematodes affecting waterbirds.
Goal 3. Wildlife and Habitat. Support diverse and abundant native fish, wildlife, and plants.		
3.1 Environmental Pool Plans	Aggressive implementation of Pool Plans using all tools available, with 30% of the portion of the priority projects/tools within the approved refuge boundary completed by 2021.	Same as Existing Condition.
3.2 Guiding Principles for all habitat management programs	Do not adopt and implement guiding principles.	Adopt and begin use of guiding principles when providing input to design and construction of projects. Principles will integrate public use and aesthetic considerations with fish and wildlife needs. Active management practices are not discouraged (e.g. moist soil, water control structures) and consideration is given to other agency guidelines.
3.3 Monitoring fish and wildlife populations	Continue current monitoring efforts on some key species and habitat indicators, moderate applied research.	Increase monitoring efforts. Amend Wildlife Inventory plan to include more species and more emphasis on habitat monitoring and research. Consult states' new Comprehensive Wildlife Conservation Plans.
3.4 Threatened and Endangered species management	Continue current monitoring of bald eagles, advisory involvement with other listed species.	By 2008, begin monitoring all federally listed threatened or endangered and candidate species and prepare management plans to help recovery. Recognize need to consider state-listed species and other "Species of Greatest Conservation Need" in state plans to help preclude federal listing.
3.5 Furbearer trapping	Continue basic trapping program until refuge trapping plan, with public involvement, is updated by 2007.	Same as existing condition, with expanded trapper and public input as outlined in strategies.
3.6 Fishery and Mussel Management	Continue current modest involvement in fishery and mussel management on the refuge, deferring to states and Service's Fishery Resource Office	Increase refuge involvement in fishery management by: 1. Completing by 2008 a Fishery and Mussel Management Plan which incorporates current monitoring and management by the states and other Service offices. 2. Hire a fishery biologist to facilitate state/ Service/refuge coordination. Wording in rationale and strategies modified to emphasize state and Corps of Engineers role.

Table 23: Objective Comparison – Existing and CCP (Continued)

Issue/Objective	Existing Condition	CCP
3.7 Commercial fishing and clamming(see 3.8 for reference to turtle harvesting)	Continue to defer to the states to monitor, regulate, and permit commercial fishing and clamming.	Increase refuge involvement in commercial fishing and clamming by: 1. Completing a Fishery and Mussel Management Plan (see Objective 3.6) 2. Issuing refuge special use permits in addition to state-required permits 3. Increase coordination with the states for commercial fishing activity to meet fishery objectives, especially in regards to invasive fish species (see Objectives 2.4 and 3.6) The Refuge will dovetail Refuge permits with state-issued permits to allow "one-stop-shopping"; emphasize state lead in fisheries; and emphasize collaborative approach with states and Corps of Engineers.
3.8 Turtle Management	Continue current limited involvement with turtle management; continue to cooperate with Corps of Engineers and the states studies and turtle management issues.	Increase refuge involvement in turtle management by: 1. completing a 3-5 year turtle ecology study of representative habitats of the entire refuge, and 2. coordinating with other agencies on turtle management actions including monitoring, harvest, and limiting disturbance to nests.
3.9 Forest Management	Continue current limited involvement with forest management; continue to cooperate with Corps of Engineers' forest inventory work.	Increase refuge involvement in forest management by: 1. Completing, with Corps of Engineers, a forest inventory for the entire refuge. 2. Hire a refuge forester to complete a Forest Management Plan and lead an active forest management program. 3. Explore ways to leverage funds to add needed forestry technicians at each District.
3.10 Grassland Management	Maintain 5,700 acres of grassland through various management tools including prescribed fire, haying, and control of invasives.	Same as Existing Condition, with additional strategies: 1. Complete a step-down Habitat Management Plan to address grassland conservation and enhancement. 2. Explore feasibility of increasing grassland acres due to importance to birds and other wildlife, and added reference to, and strategy for, sand prairie areas.
Goal 4. Wildlife-Dependent Recreation. Ensure abundant and sustainable opportunities for a broad cross-section of the public.		
4.1. General Hunting	Maintain a minimum of 192,219 acres (80%) of land and water open to all hunting. Make no changes to current 8 No Hunting Zones for a total of 3,555 acres.	Maintain a minimum of 187,102 acres (78%) of land and water open to all hunting and clarify this benchmark. Add 4 new No Hunting Zones totaling 505 acres (12 zones total).

Table 23: Objective Comparison – Existing and CCP (Continued)

Issue/Objective	Existing Condition	CCP
4.2 Waterfowl hunting closed areas and sanctuaries	Continue current system of 14 Closed Areas and one Sanctuary (no entry). No change in current entry or use regulations. Make only minor adjustments to some areas to clarify boundaries or address operation/maintenance needs. Total acres = 44,544 Closed Areas = 14 Sanctuaries = 1	In fall 2007 (except fall 2009 for Pool 4): 1) Add 8 new closed areas/sanctuaries and delete or modify the current 15 for a total of 23. 2) Add 2 new Waterfowl Sanctuaries (no entry) for a total of 3: a. Pool Slough Sanctuary (McGregor District, Pool 9, Iowa/Minnesota) b. Guttenburg Ponds portion of the 12 Mile Slough Closed Area (McGregor District, Pool 11, Iowa) c. Spring Lake Sanctuary (Savanna District, Pool 13, Illinois – existing) 3. Voluntary Avoidance on all large closed areas Oct. 15 to the end of the respective state duck season and no motors and Voluntary Avoidance on small closed areas (~1,000 acres or less) Oct. 15 to the end of the respective state duck season. Exceptions for sancturaries and Bertom/McCartney Closed Area, Pool 11. Establish threshold for disturbance. 4) Wisconsin River Delta Special Hunt Area: Closed to hunting and trapping, and a voluntary avoidance area, November 1 to end of duck hunting season. 5) Some boundary adjustments to the Lake Onalaska Closed Area. The Voluntary Avoidance Area would continue. 6) Policy and strategy added to address fish habitat projects in closed areas. Total acres= 43,652 Closed areas = 20 Sanctuaries=3
4.3 Waterfowl hunting regulation changes	No major changes to current waterfowl hunting regulations.	In 2007, prohibit open-water waterfowl hunting in Pool 11, river miles 586-592, Grant County, Wisconsin. No daily shotshell limit or hunter spacing regulation.
4.4 Firing Line -- Pool 7, Lake Onalaska, La Crosse District	Status quo, do not address the firing line issue beyond existing laws and regulations.	By Oct. 1, 2006, develop plan in cooperation with local waterfowlers and state managers and conservation officers for the area north of the Lake Onalaska Closed Area (Gibbs Lake) to address firing line issue.
4.5 Permanent hunting blinds on Savanna District	Continue current program.	Phase-out the use of permanent hunting blinds and the practice of leaving decoys sets overnight beginning with Pool 12 after the 2006-07 season, Pool 14 after the 2007-08 season, and Pool 13 after the 2008-09 season.
4.6 Potter's Marsh Managed Hunt Savanna District	Continue current program but make some administrative changes.	For 2006-07 hunting season, implement a variety of administrative changes. Permanent blinds would be eliminated after the 2007-08 season, but boat blind sites provided and managed.
4.7 Blanding Landing Managed Hunt Program (Lost Mound Unit, Savanna District)	Continue current managed hunt as previously managed by the Illinois DNR: 15 permanent blind sites awarded by drawing.	After the 2006-07 season, eliminate the managed hunt program, including use of permanent blinds. Open to all on first come basis.

Table 23: Objective Comparison – Existing and CCP (Continued)

Issue/Objective	Existing Condition	CCP
4.8 Fishing	Provide 140,545 acres of surface water open to year-round fishing. An additional 2,736 acres open except October 1 to the end of the state duck hunting season. Maintain 15 fishing piers/docks.	Provide approximately 140,000 acres of surface water open to year-round fishing. An additional 5,050 acres open except Oct. 1 to the end of the state duck hunting season. Add 3 new fishing piers/docks for total of 18.
4.9 Fishing Tournaments	Continue current "hands off" approach to regulating fishing tournaments.	Issue refuge special use permits for tournaments in addition to state-required permit, to minimize impact to sensitive fish, wildlife, and habitat. Implement "one-stop-shopping" by dovetailing Refuge permits with state-issued permits. Emphasize the state's lead in fisheries management and collaborative work with states and Corps of Engineers.
4.10 Wildlife Observation and Photography	Maintain the following existing facilities: 15 observation areas 6 hiking trails 4 canoe trails 3 biking trails 1 auto tour route	Maintain the following existing or new facilities: 25 observation areas 14 hiking trails 19 canoe trails 6 biking trails 3 auto tour routes 3 observation towers 4 photography blinds
4.11 Interpretation and Environmental Education	Maintain 59 interpretive signs. Continue Refuge brochure and website. Sponsor 1 major annual interpretive event on each District. No change in current visitor services staffing.	Maintain 102 existing and new interpretive signs. Build 3 new District Offices and new Lost Mound office, all with visitor contact facilities. Do not build major visitor center. Continue refuge brochure and website. Sponsor 2 major annual interpretive events and establish 1 environmental education program on each district. Add visitor services specialists to McGregor and Winona Districts, and one at the Nat'l Miss. River Museum in Dubuque.
4.12 Fish Floats	Continue to allow 4 existing fish floats under current annual permits, stipulations, and $100 annual fee.	Develop new standards for fish float facilities and operations, including new concession fees. Phase out floats that can not meet those standards, however, solicit new proposals for any float phased out for not meeting standards. Base decision to replace floats on adequacy and feasibility of proposals.
4.13 Guiding services	Continue inconsistent, low-key approach to issuing permits for hunting, fishing, and wildlife observation guiding.	Provide policy and consistent process for issuing permits for hunting, fishing and wildlife observation guide services. Coordinate with the states for consistency with their permitting requirements. Cooperate with the states and the Corps of Engineers to provide "one-stop-shopping" for permits when possible.

Table 23: Objective Comparison – Existing and CCP (Continued)

Issue/Objective	Existing Condition	CCP
Goal 5. Other Recreational Use. Provide opportunity for traditional and appropriate non-wildlife dependent use that is compatible with the Refuge.		
5.1. Beach use and maintenance policy and regulations	Open policy. No limits on areas open to camping, boat mooring, swimming, social gatherings, picnicking and other non-wildlife-dependent uses, subject to current regulations. No new regulations and use current guidance for beach maintenance.	Open-unless-closed policy. All areas currently open to camping, boat mooring, swimming, social gatherings, picnicking and other non-wildlife-dependent uses, would remain open, except: 1) Current camping area regulations remain in effect (all open, except in sight of main channel and not in Closed Areas during waterfowl season). 2) Managers may close areas for bona fide wildlife and human health and safety concerns; maintain proper coordination with states and Corps of Engineers and notice to public. 3) Enforce existing alcohol regulations 4) Increased "Leave No Trace" education and outreach. Human solid waste must either be removed or buried on-site in accordance with other back country public land regulations. 5) Regulations prohibiting the use of glass food and beverage containers on Refuge lands added. 6) New camping definition retained. 7) Retain "explore" user fee for camping and other beach-related uses, but wording added for interagency and citizen involvement before crafting any proposal. 8) "Adopt-A-Beach" program strategy added 9) Articulate clear beach maintenance policy, and work with interagency teams to complete beach plans by pool.
5.2. Electric Motor Areas and Slow, No Wake Areas	Current program with only 1 electric motor area of 222 acres (Mertes Slough, Winona District).	Designate 5 electric motor areas (4 are new, Mertes existing) encompassing 1,852 acres, and 8 slow, no wake areas* encompassing 9,720 acres. Black River Bottoms and Nelson-Trevino SNWAs effective 2008 and 2009 respectively. Delete 4 areas from any designation. All current uses allowed. **From March 16 through October 31, Slow, No Wake for watercraft and no airboats or hovercraft allowed.*
5.3 Slow, No Wake Zones	Maintain 2 existing slow, no wake zones administered by the Refuge, and assist in enforcement of 44 others.	Add 11 new Slow, No Wake Zones, bringing total to 13 administered by the Refuge, and assist with enforcement of 44 others. Spring Lake and Crooked Slough (Lost Mound): adopt Iowa regulation of under 5 mph if within 100 feet of another vessel going under 5 mph versus slow, no wake.

Table 23: Objective Comparison – Existing and CCP (Continued)

Issue/Objective	Existing Condition	CCP
5.4. Dog use policy	Maintain current regulations: dogs and other animals must be confined, except dogs during hunting seasons. No field trials or commercial training will be permitted (current policy).	Adopt regulation which safeguards wildlife and visitors yet allows dog exercising: No dogs are allowed to disturb or endanger wildlife or people, and must be under the control of their owners/ handlers and leashed when on hiking trails or other areas so posted. Exercising retrievers allowed and dogs exempt during authorized hunting. Provision for cleaning up after dogs included. Professional training and field trials remain prohibited.
5.5. General Public Use Regulations	Make no changes to public entry and use regulations for the Refuge.	Conduct annual review, and update as needed, general public use regulations governing public entry and use of the Refuge. Complete a Law Enforcement step-down plan for the Refuge in cooperation with the states and Corps of Engineers.
Goal 6. Administration and Operations. Seek adequate funding, staff, and facilities; improve public awareness of Refuge.		
6.1 Office and shop facilities	Maintain existing offices (6) and shops (5), but replace the maintenance facilities at Winona and Savanna Districts by 2006.	By 2010, construct new offices and maintenance shops at Winona, La Crosse, and McGregor Districts, and expand the office and construct a new maintenance shop at Savanna District. Each office would feature a biological work area or lab, and modest visitor facilities. Refuge Headquarters would be integrated with either the Winona or La Crosse offices. By 2020, remodel or replace office and shop at the Lost Mound Unit.
6.2 Public access facilities	Maintain and modernize as needed, 25 existing public boat accesses.	Add 1 new boat access, 4 new walk-in accesses, 1 new and 1 improved canoe landing, and improve 5 parking areas.
6.3. Operations and maintenance needs	Complete annual review of Refuge Operating Needs System (RONS), Maintenance Management System (MMS), and Service Assessment and Maintenance Management System (SAMMS) databases to ensure these reflect needs of current direction.	Complete annual review of Refuge Operating Needs System (RONS), Maintenance Management System (MMS), and Service Assessment and Maintenance Management System (SAMMS) databases to ensure these reflect needs of management direction with a wildlife and integrated public use focus. Account for maintenance needs of large habitat projects (e.g. Environmental Management Program projects).
6.4. Public information and awareness	Continue current annual average of 80 media interviews, 125 news releases, and 25 special events (special programs, presentations, and displays at others' events). Maintain existing 66 kiosks.	Increase by 50 percent the current annual average of 80 media interviews, 125 news releases, and 25 special events (special programs, presentations, and displays at others' events). Add 49 kiosks. Take advantage of technical and specialist positions to increase outreach.
6.5 Staffing needs	No change in staffing level of 37 people (37 FTEs)	By 2021, increase staffing to 60.5 FTEs to bring all Districts to minimum staffing level, add specialists to Headquarters, increase staff at Lost Mound Unit (priority would be a blend of wildlife and public use positions), add 4 full-time Refuge Officers based on public and agency comment.

Table 24: Summary of Project Features

Feature	Existing Features		CCP		Comments for CCP
	Units	Acres or Miles	Units	Acres or Miles	
Waterfowl Closed Areas and/or Sanctuaries	15	44,544	23	43,652	
No open water hunting areas	0	0	1	4,000	1 area in Pool 11
Managed / Special Hunts	2	2,434	3	~3,530	Gibb's Lake, Pool 7; Wisconsin River Delta, Pool 10; Potter's Marsh, Pool 13
Administrative no hunting zones	8	3,555	12	4,060	Existing and CCP acres include Lost Mound Contaminated No Entry Area (2,467 acres)
Fish catch and release area	1	700	1	700	
Heron sanctuary	0	0	0	0	
No-wake zones	46	NA	57	N/A	
Electric motor areas	1	222	5	1,852	
Slow, No Wake Areas	0		8	9,720	
Research Natural Areas	4	6,946	4	6,946	
Trails					
Canoe trails	4	32.1	19	120.6	
Hiking trails	6	20.5	14	36.5	
Auto tour routes	1	2.5	3	11.0	
Biking trails	3	10.0	6	21.1	
Access Facilities					
Fishing Piers	15	NA	20	N/A	
Commercial fishing floats / piers	4	NA	4	N/A	
Boat access	25	NA	26	N/A	
Walk-in access	0	NA	4	N/A	
Canoe landing / launch	1	NA	2**	N/A	** Includes proposed improvement to Reno Canoe Launch (non-FWS)
Parking lot improvements	0	NA	5	N/A	
Wildlife Observation Facilities					
Observation decks/areas	15	NA	25	N/A	
Observation towers	0	NA	3		
Photo blinds	0	NA	4	N/A	
Signage					
Kiosks	66	NA	115	N/A	
Interpretive signs	59	NA	102	N/A	
Entrance signs	25	NA	30	N/A	
Official Notice Boards	30	NA	49	N/A	
Proposed Buildings					
Build new maintenance facilities	2	NA	5	N/A	
Build new office facilities	0	NA	3	N/A	HQ office combined with Winona or La Crosse office.
Build major visitor center	0	NA	0	N/A	
Refuge Staffing	37.0	NA	60.5	N/A	Number of FTEs (Full Time Equivalents)

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 4	Stabilize Crats Island	Lower Big Lake	Big Lake	Robinson Lake (mud flats)	Restoration of Distribut-ary Channels of Zumbro River	L&D 4	Barton / Lofgren Tract	Pool-wide	Zumbro River bottoms	Peterson Lake HREP	Barton / Lofgren Tract	Chippewa River delta	Barton Lofgren	Hire Private Lands Biologist	Chippewa River
	Stabilize Islands Lower Pool (WI)	Peterson Lake	Robinson Lake	Rieck's Lake (mud flats)	Block break in Catfish Slough			Rieck's Lake	Remaining 1987 Master Plan tracts within floodplain	Nelson/ Trevino Research Natural Area	Indian Slough delta	Nelson-Trevino bottoms	Grand Encamp-ment	Coop Agree. for buffers to reduce runoff	Buffalo River
	Stabilize Island Robinson Lake	Robinson Lake	Peterson Lake								Monitor Pool-wide	Main channel and barrier island	Crats Island		
	Monitor Drury and Hershey Islands	Beef Slough	Plan with new island const-ruction									Complete Forest Inventory by 2006	Finger Lakes Disposal Site		

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 5	Protect Islands near Buffalo City	Lower Pool 5 Island cluster	Weaver bottoms	Spring Lake	Restoration of distributary channels of Zumbro River	L&D 5	Lizzy Paul's Pond	Pool-wide	Buffer around Lizzy Paul's Pond	Finger Lakes HREP	Lost Island/ Weaver	Main channel and barrier islands	Wabasha Prairie	Hire Private Lands Biologist	Zumbro River
	Monitor Sommer-feld Islands	Weaver bottoms / Lost Island	Spring Lake	White-water delta	Evaluate flowing channels off Zumbro River to Weaver bottoms			Lizzy Paul's Pond	Zumbro River delta	Island 42 HREP	Wabasha Prairie	Complete forest inventory	Swan Island	Coop Agree. for buffers to reduce runoff	White-water River
		Lower Pool 5 Seed Islands	Lower Pool	Weaver Islands					Remaining 1987 Master Plan tracts within floodplain	Weaver Islands	Monitor Pool-wide		Spring Lake HREP		
		Krueger Slough area	Plan with new island construct-ion							Spring Lake HREP					

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 5A	Protect Islands in Lower Pool	Polander Lake Seed Islands	Snyder Lake	Maintain mud flats Polander Islands	Evaluate side channel closures, wing dams and other structures	L&D 5A		Pool-wide	Remaining 1987 Master Plan tracts within floodplain	Polander Phase 1 and 2 HREP	Twin Lakes	Minnesota City bottoms	Prairie Island Natural Area	Hire Private Lands Biologist	Garvin Brook
	Monitor existing islands	Additional islands in Polander	Betsy Slough							Prairie Island Natural Area	Prairie Island Natural Area	Main channel and barrier islands	McNally Landing	Coop Agree. for buffers to reduce runoff	
			Twin Lakes								Prairie Island Dike		Polander Channel Island		
			Polander								McNally Landing		Polander Island		
			Plan with new island construct-ion								Monitor Pool-wide				

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 6	Monitor existing islands	Lower Pool 6	Lower Pool (secondary and tertiary islands)	Pools A & E on Tremp-ealeau NWR	Modificat-ion of training structures	L&D 6	Pool C2 Tremp-ealeau NWR	Pool-wide	Remaining 1987 master plan tracts within floodplain	Protect Refuge Islands	Pool 6 Islands	Refuge Islands	Tremp-ealeau NWR	Hire Private Lands Biologist	Tremp-ealeau River
		Pools A & B of Tremp-ealeau NWR	Upper Pool (secondary and tertiary islands)		Modificat-ion of road and railroad embankmen ts, levees			Pool A Tremp-ealeau NWR			Tremp-ealeau NWR	Tremp-ealeau NWR		Coop Agree. for buffers to reduce runoff	Trout Creek
			Pools A & B Tremp-ealeau NWR in conjunction with island construct-ion								Monitor Pool-wide				

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 7	Lake Onalaska	Lake Onalaska	Black River bottoms	Lake Onalaska	Black River bottoms	L&D 7	Lower Halfway Creek Marsh	Pool-wide	Black River bottoms	Completed EMP and other habitat projects	Lake Onalaska	Black River bottoms & delta	Midway Railroad Prairie	Hire Private Lands Biologist	Sand Lake Coulee / Halfway Creeks
	Main channel islands		Lake Onalaska		Lake Onalaska				Halfway Creek Addition	Black River bottoms	Black River bottoms	Lake Onalaska Islands	Mathy Prairie	Coop Agree. for buffers to reduce runoff	Black River
			Upper Pool 7		L&D 7				Office site	Halfway Creek Marsh	Halfway Creek Marsh	Barrier Island complex	Brice Prairie	La Crosse County (WI) and Winona County (MN)	
									Remaining 1987 master plan tracts			Main channel islands			

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 8	East Island	Phase III/ Pool 8 Islands	Phase III, Pool 8 Islands	Phase III/ Pool 8 Islands	Root River	L&D 8	Root River bottoms	Continue monitoring the 2001-02 draw-downs	1987 Master Plan tracts	Completed EMP and other habitat projects	Lower Pool 8	Root River delta	Root River bottoms	Hire private lands biol.	Root River
	Main channel islands	Shady Maple	Schnicks Bay	Shady Maple	L&D 7			Pool-wide	Root River Addition	Lawrence Lake	Main channel islands	Goose Island		Coop Agree. for buffers to reduce runoff	Gills Coulee Creek/ La Crosse River
	West Channel Island	Phase IV/ Pool 8 Islands	Shady Maple	Phase IV/ Pool 8 Islands	L&D 8					Blue Lake	Shore Acres Road	Main channel islands & barrier islands		Vernon & La Crosse Counties (WI) and Winona & Houston Counties (MN)	Pine Creek
	Running Slough		Running Slough		Shore Acres/ Sheperds Marsh Area					Target Lake	Bluff Slough				Mormon Coulee Creek
			Broken Arrow Slough		Continue Lower Pool 8 Channel Mgmt. Plan					Root River bottoms	Running Slough				Coon Creek
			Lawrence Lake												
			West Channel												
			Black River												

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 9	Harpers Slough	Harpers Slough	Harpers Slough	Harpers Slough	Breech berm of Upper Iowa River	L&D 9		Pool-wide	1987 Master Plan tracts	Conway Lake	Rush Creek delta	Conway Lake		Hire Private Lands Biologist	Upper Iowa River
	Capoli Slough	Capoli Slough	Capoli Slough	Capoli Slough	L&D 8					Existing EMP Projects	Cold Springs	Upper Iowa River Delta		Breech berm of Upper Iowa River	Bad Ax River
	Lake Winne-shiek	Conway / Phillipi	Conway / Phillipi	Lake Winne-shiek						Reno bottoms	Crooked Creek (Reno)	Reno bottoms		Coop Agree. for buffers to reduce runoff	Village Creek
	Willow Island	Lake Winne-shiek	Lake Winne-shiek	Goose Carcass Lake area							Reno Bottoms	Wexford Creek delta			Kettle Creek (Cold Springs)
	Boot Jack Island	Lower Harpers Slough	Lansing Big Lake area								Winne-shiek Creek				Winne-bago Creek
			Goose Carcass Lake area												Wexford Creek
															Rush Creek
															Sugar Creek

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 10	McGregor Lk.	McGregor Lk.	McGregor Lk.	McGregor Lk.	Jay's Lake/ State Line Slough	L&D 10		Pool-wide	1987 Master Plan Tracts	Pool 10 Islands (lower pool)	Inventory pool	Pool-wide		Hire Private Lands Biologist	Yellow River
	Pool 10 islands (lower pool)	Pool 10 islands (lower pool)	Pool 10 islands (lower pool)	Pool 10 islands (lower pool)						Existing EMP projects					
	East Channel Island (nav channel side)		Harpers Slough (upper pool complex)		Grimmel Lake									Coop Agree. for buffers to reduce runoff	Paint Creek
			Jay's Lake / State Line Slough												Sny McGill
			French-town Lake												Bloody Run
															Wisconsin River

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 11	Patzner Island	Pool 11 Islands incl. Sinnipee Creek Islands	Ball's Island	Pool 11 Islands (lower pool)	Hay Meadow Lake	L&D 10 spillway	Turkey River bottoms	Pool-wide	Turkey River	Hay Meadow Lake bottoms	Inventory pool-wide	Turkey River delta		Hire Private Lands Biologist	Turkey River
	Snyder Island		Snyder Island				Restore Big Pond system		1987 Master Plan tracts	Existing EMP projects		Pool-wide		Coop Agree. for buffers to reduce runoff	Little Maquok-eta River
	Coal Pit Slough		Jack Oak Island									Dago Slough			Grant River
	Jack Oak Island		Spring-Dead Lake									Patzner Island			Platte River
	Below L&D 10		Little Maquoketa River delta												

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 12	RM 572.2 Meno-minee Slough	Barrier islands in Lower Pool 12	Sunfish Lake, Fish Trap Lake, Stone Lake		Modify Dam 11 to introduce flows	Include in dam renov.		Pool-wide	1987 Master Plan tracts	EMP projects	Purple loose-strife, Reed canary grass, Cucumber vine, Multiflora rose, Garlic mustard	Nine Mile Island	Control invasives with fire, mechanical, chemical	Hire Private Lands Biologist	Galena River
	RM 559.8		No Name Lake, Kehough, Tippy		Kehough Slough							Mid-pool 12		Coop Agree. for buffers to reduce runoff	Meno-minee River
	RM 576.8 Island 228		Nine Mile Island		Fish Trap Lake							Bellevue Slough			
	Monitor existing islands along main channel		Wise Lake		Sunfish Lake							Lower Pool 12			
			Frentress Lake, East Dubuque complex												
			White City / Stump Island												

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**															
Pool	**Protect Islands**	**Construct Islands**	**Increase Depth, Dredge**	**Construct Mud/Sand Flats**	**Direct Water Flows**	**Fish Passage**	**Construct Moist Soil Units**	**Pool Draw-downs**	**Land Acquisition**	**Maintain Existing Habitat**	**Reduce Invasive Species**	**Forest Manage-ment**	**Prairie Manage-ment**	**Assist Private Land-owners**	**Watershed Manage-ment**
Pool 13	RM 548.6 Maq. River	Lower Pool 13 Islands	Spring Lake		Modify Dam 12 to increase flows / carry silt	Include in dam renov.		Pool-wide	1987 Master Plan tracts	EMP Projects	Purple loose-strife, Reed canary grass, Cucumber vine, Multiflora rose, Garlic mustard	Increase island elevation with dredge material for bottom-land trees on main channel islands and barrier islands.	Control invasives with fire, mech-anical, chemical Restore native prairies	Hire Private Lands Biologist	Maquoketa River
		Elk River islands	Lower Pool and Gomer's Lake											Coop Agree. for buffers to reduce runoff	Elk River
	RM 540.0 Kellers Island	Plan with dredge projects	Crooked Slough		Construct low berm to deflect flow from Elk River										Plum River
	RM 540.6		Millers Hollow												Apple River
	Monitor existing islands along main channel		Running Slough												
			Elk River												
			Pin Oak Lk.												

Table 25: Refuge Priority Locations and Actions That Contribute to Implementation of Environmental Pool Plans, 2006-2021*, Upper Mississippi River NWFR (Continued)

Environmental Pool Plan Actions Needed to Achieve Desired Future Habitat**

Pool	Protect Islands	Construct Islands	Increase Depth, Dredge	Construct Mud/Sand Flats	Direct Water Flows	Fish Passage	Construct Moist Soil Units	Pool Draw-downs	Land Acquisition	Maintain Existing Habitat	Reduce Invasive Species	Forest Manage-ment	Prairie Manage-ment	Assist Private Land-owners	Watershed Manage-ment
Pool 14	Monitor existing islands along main channel		Beaver Island		Increase flows with modif-ication of Dam 13 to Jacobs Slough	Include in dam renov.			1987 Master Plan Tracts	EMP Projects	Purple loose-strife, Reed canary grass, Cucumber vine, Multiflora rose, Garlic mustard	Increase Island elevation with dredge material for trees: Meredosia Island, Swan Island, Steamboat Island, Wapsi bottoms	Control invasives with fire, mech-anical, chemical	Hire Private Lands Biologist	Rock Creek
			Steamboat Island		Restore side channel and braided sloughs: Meredosia Island and Swan Island								Restore native prairies	Coop Agree. for buffers to reduce runoff	Wapsip-inicon River
			Rock Creek Shricker's Lake												
			Wapsipin-icon River bottoms												
Total Actions	37	28	60	18	28	13	7	11	20	27	32	32	21	12	39

* Locations are in priority order within each pool, top to bottom.

**Environmental Pool Plans (Pools 2-11) were endorsed by the River Resources Forum, St. Paul District, US Army Corps of Engineers. Pool Plans were developed by the Forum's Fish and Wildlife Workgroup and reviewed by the public. Pool Plans for Pools 12-14 were endorsed by the River Resources Coordinating Team, Rock Island District, US Army Corps of Engineers and developed by the Team's Fish and Wildlife Interagency Committee.

Chapter 5: Plan Implementation

Introduction

This chapter summarizes the actions, funding, coordination, and monitoring to implement the CCP. As noted in the inside cover of this document, these plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition. These decisions are at the discretion of Congress in overall appropriations, and in budget allocation decisions made at the Washington and Regional levels of the Service.

A Word about Priorities

In the Refuge Improvement Act of 1997, Congress established a three-tiered hierarchy, or three priorities, for refuge management. As a first priority, every refuge is to be managed to fulfill its purposes and the Refuge System mission, namely conservation of fish, wildlife, and plants. Secondly, refuges are to facilitate wildlife-dependent or "Big 6" public uses, namely hunting, fishing, wildlife observation and photography, and interpretation and environmental education. Of lowest priority is managing other uses and activities such as general recreation.

However, setting priorities in a linear or in-order fashion (e.g. implementing from top to bottom on a list of prioritized actions) is generally not realistic when dealing with the complexities and multi-program nature of managing a national wildlife refuge. In practice, especially on this Refuge given its size, length, interface with multiple states and agencies, and visitation levels for both wildlife-dependent and other recreation, a linear approach is not workable. Below are a few of the reasons why some actions identified in this Implementation Plan must be done simultaneously, or why some general recreation actions are done before other resource-related actions.

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Funding streams from Congress may not follow an established hierarchy. For example, there may be no appropriations for land acquisition or habitat restoration in a given year, but Congress may choose to fund visitor services enhancement packages.

A high priority such as habitat restoration is costly on a major river and dependent on funding from other sources, such as the Environmental Management Program administered by the Corps of Engineers. Thus, habitat restoration may be the highest priority for the Refuge, but if the funding is lacking, it cannot be accomplished.

The states or Corps of Engineers may have year-to-year priorities which benefit visitors to the Refuge and meets a Refuge objective. An example would be state funding for recreation enhancement such as access development or

beach maintenance which must be spent in a given year or lost. In this case it is an urgent need in a fiscal sense, although a lower priority resource-wise.

The public or other units of government may strongly urge actions which may not be high resource priorities, or staff may be confronted with health, safety, or societal needs which must be addressed. Examples include a right-of-way expansion for a utility or highway project, beach maintenance in a certain pool, boat landings and other accesses, and fish float administration.

Many actions are integrated with other actions. For example, Waterfowl Hunting Closed Areas are designed first and foremost to offer waterfowl resting and feeding areas during the fall migration. These areas also impact hunting, the quality of hunting, and can impact the resource if a firing line develops along a closed area boundary and leads to increased crippling loss of waterfowl. It is also important to limit disturbance to waterfowl using the closed areas, which leads to guidelines or regulations for public entry during critical times. Thus, many actions must be done simultaneously to achieve multiple objectives.

Some actions must be sequenced. For example, Objective 3.7 calls for the Refuge to devise a system for dove-tailing Refuge commercial fishing permitting requirements with the existing states' existing permit systems. Doing this before completing a Fishery and Mussel Management Plan (Objective 3.6) would be premature since the plan would set goals and objectives which would be addressed in permit stipulations.

Given the above, the actions listed below are in two categories: those that can be completed with existing funding and staffing, and those that will take additional resources. Target dates for completion give an indication of the priority and are useful for planning workloads in any given year. Many actions are ongoing as noted, and some of these may also be included in a step-down plan (see list on page 162). If an action has the date of 2021, this means the action will be done no later than 2021, the 15-year planning horizon for the CCP. It is hoped that many of these actions will be completed well ahead of that date. This list is not all inclusive and details in specific objectives, along with all the strategies, will be used as applicable in implementing the CCP.

Actions – Existing Funding and Staffing

The following actions are derived from objectives and strategies in the CCP and represent those actions that can be accomplished with existing resources. Some of these actions reflect current, ongoing efforts, but most require a new initiative and/or redirection of existing Refuge funding and staff effort. This list will help focus annual work planning and performance plan preparation during the 15-year life of the plan. Details of these actions are found in Chapter 4.

Goal 1: Landscape

1. Prepare and print a new Land Use Allocation Plan in cooperation with the Corps of Engineers (2021).
2. Continue modest land acquisition program (ongoing).
3. Explore land exchanges with the states (2021).
4. Continue work with the Department of the Army for land transfers at the Lost Mound Unit (Savanna Army Depot) (ongoing).
5. Complete a management plan for each Research Natural Area (2010).
6. Seek cooperative research/monitoring opportunities in Research Natural Areas (ongoing).
7. Conduct yearly boundary reviews of Research Natural Areas (ongoing).
8. Facilitate nomination package for Wetland of International Importance (2008).

Goal 2: Environmental Health

1. Increase assistance agreements with watershed partners (ongoing).
2. Continue interagency efforts on watershed partnerships and pool drawdowns (2021).
3. Increase emphasis on water quality through habitat projects, support of state and federal initiatives, public information efforts, and interpretive and environmental education programs (ongoing).
4. Increase cooperation and public education to address invasive species (ongoing).

Goal 3: Wildlife and Habitat

1. Implement Pool Plans to extent possible working with Corps of Engineers and states using funding sources such as the Environmental Management Program (2021).
2. Adopt and use guiding principles for habitat projects (2006).
3. Amend the Wildlife Inventory Plan (2008).
4. Establish a Refuge Research Team and conduct formal coordination meetings with U.S. Geological Survey (2008).
5. Complete an Invasive Plant Control and Management Plan (new, 2009)
6. Complete a Habitat Management Plan (2021).
7. Complete a management plan for each federally-listed threatened and endangered species on the Refuge (2010).
8. Update the Refuge Trapping Plan (2007).
9. Complete a Fishery and Mussel Management Plan, including aquatic invasive animals (2008).
10. Conduct public information and education effort about turtles on the Refuge (ongoing).
11. Continue to use fire for habitat management – implement the Refuge's Fire Management Plan (ongoing).
12. Conduct more active grassland management; include in Habitat Management Plan (ongoing and 2021).

Goal 4: Wildlife-Dependent Public Use

1. Update the Refuge Hunting Plan (2007)
2. Establish new administrative No Hunting Zones to avoid user conflicts or address safety issues (2007).
3. Modify the Waterfowl Hunting Closed Area System and regulations; post all areas each year (2007, 2009 and ongoing).
4. Monitor waterfowl use and human disturbance in the Waterfowl Hunting Closed Area System (ongoing).
5. Implement waterfowl hunting regulation changes (2007).
6. Complete plan for Gibbs Lake Area, Lake Onalaska, Pool 7 (2006).
7. Phase-out use of permanent waterfowl hunting blinds in Savanna District (2007 to 2009).
8. Modify the Potter's Marsh managed hunt, Savanna District (2006).
9. Eliminate the Blanding Landing managed hunt, Savanna District (Lost Mound) (2007).
10. Conduct public information campaign (media, leaflets, meetings) and increase law enforcement presence for all hunting-and-fishing-related changes (ongoing).
11. In cooperation with states and Corps of Engineers, and others, develop plan for dove-tailing Refuge permitting requirements for fishing tournaments (2008).

12. Write standards for commercial fish float facilities and operations (2006).
13. Implement consistent process for regulating commercial guiding operations (2008).

Goal 5: Other Recreational Use

1. Implement new policies and regulations related to camping and beach-related uses (2007).
2. Implement new beach maintenance policy and complete beach plans in cooperation with Corps of Engineers and the states (2006 and ongoing).
3. Explore user fee system to off-set maintenance and administrative costs of other recreational uses (ongoing).
4. Establish and post Electric Motor Areas and Slow, No Wake Areas (2007 for most, 2008 for Black River Bottoms and 2009 for Nelson-Trevino).
5. Establish new No Wake Zones (2007 to 2021).
6. Implement new regulation dealing with dogs (2007).
7. Annually review and update as needed public use regulations (ongoing).
8. Conduct public information campaign (media, leaflets, meetings) and increase law enforcement presence for all general recreational use changes (2006 and ongoing).

Goal 6: Administration and Operations

1. Review and update databases for operations and maintenance needs (ongoing).

Actions – New Funding and Staff

The actions shown in goal charts on the following page are derived from objectives and strategies in the CCP and represent those actions that can be accomplished if new funding and/or staffing is allocated to the Refuge. The completion target for these actions is generally 2021 given the unknown nature of funding. Actions in Goals 1 through 3 are the highest priority since they directly support the protection and enhancement of fish and wildlife and their habitat. However, new staff in Goals 4 through 6 also directly support resource-related work. Details of these actions are identified in Chapter 4.

Costs are estimates and will likely be higher or lower based on detailed project planning and timing of implementation. Staff costs reflect 2005 salary and benefit rates at grades normal for the positions described. These needs will be reflected in key Refuge System databases such as the Refuge Operating Needs System, Maintenance Management System, and Service Assessment and Maintenance Management System which provide information used in budget formulation and allocation. The Refuge will also seek other project funding such as cost share agreements with partners, agency grant programs, grants from non-profit groups, and cost-saving or reprogramming measures within existing budget allocations. Implementing Environmental Pool Plans (Goal 3, Action 1) could be partially accomplished through the Corps of Engineers-administered Environmental Management Program and the Navigation and Environmental Sustainability Program (NESP) if authorized and funded by Congress.

Funding Summary

Total funding needs for the 15-year life of the CCP equals the one-time or project-specific costs plus the recurring costs per year times 15 years, or a total of $227.8 million. Of this total, $177 million or 78 percent is directly related to habitat restoration and maintenance and land acquisition.

Summary of Step-Down Plans Needed

A list of the step-down plans called for in the CCP or required by Service policy can be found on page 165. The planned completion date is in parenthesis, as well as a notation as to whether the step-down plan is new or a revision of an existing plan. These Refuge-specific plans provide the details of implementing the respective program or initiative described in broad terms in the objectives and strategies, and in this chapter. These plans will be developed in consultation with other agencies, states, and partners. The public will be given ample opportunity for plan review and comment. Environmental assessments or other documentation may also be needed to comply with National Environmental Policy Act or other requirements.

Goal 1: Landscape

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
1. Re-survey and post Refuge boundary where problems are greatest in cooperation with the Corps of Engineers		$50
2. Acquire an average of 1,000 acres per year within approved Refuge boundary (Land and Water Conservation Fund funding)		$1,500

Goal 2: Environmental Health

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
1. Hire private lands biologist or technician for each of the Refuge's four districts to work in watersheds		$ 280
2. Establish Access Trust Fund for recreational access work to facilitate pool drawdowns	$3,000	
3. Hire temporary, seasonal technicians to complete invasive plant inventory	$ 250	
4. Write invasive plant control and management plan	$ 25	
5. Hire fishery biologist to coordinate invasive animal control and management		$100

Goal 3: Wildlife and Habitat

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
1. Implement at least 30 percent of Refuge-priority Environmental Pool Plan actions	$150,000	
2. Hire a biologist for Districts without (2) to coordinate wildlife and habitat monitoring and management		$200
3. Monitor all federally-listed threatened and endangered species, assist with state-listed species		$20
4. Hire permanent, part-time receptionist/permit specialist at each District to handle inquiries and permits related to both fish and wildlife and various commercial uses		$120
5. Develop cooperative agreements with states for sharing commercial fishing permittee and catch information (fishery biologist responsibility, costs already captured)		N/A
6. Initiate 3-5 year turtle ecology study; complete turtle management plan	$100	
7. Complete, with Corps of Engineers, Forest Inventory of the Refuge	$75	
8. Hire Refuge Forester; complete Forest Management Plan		$100

Goal 3: Wildlife and Habitat (Continued)

9. Annual maintenance needs for constructed habitat projects through EMP or other sources		$360

Goal 4: Wildlife-Dependent Public Use

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
1. Construct 3 new fishing piers or docks	$ 100K	
2. Construct a variety of observation decks and trails to foster wildlife observation and photography	$ 500K	
3. Hire visitor services specialists at McGregor and Winona Districts to increase programs and services, and one to be stationed at the National Miss. River Museum in Dubuque (3 total, Districts highest priority).		$ 240K
4. Develop and print updated maps of the Refuge, by pool, for public distribution	$ 50K	
5. Develop and install interpretive exhibits at offices	$ 100K	

Goal 5: Other Recreational Use

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
1. Annual funding needs to support signing, posting, leaflets, Leave No Trace program, law enforcement, permit administration, and other aspects of managing recreation on the Refuge.		$100
2. Hire 4 additional full-time law enforcement officers, one for each District, to enforce Refuge recreation and wildlife regulations	$100 (vehicles/ equip)	$300

Goal 6: Administration and Operations

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
1. Construct offices in support of overall Refuge administration, management, and public use (Winona, La Crosse, McGregor, Lost Mound Unit, and Headquarters)	$10,000	$100
2. Construct maintenance shops and equipment storage buildings at all Districts and Lost Mound Unit	$3,500	
3. Hire 3 maintenance staff for stations either without or to increase District capability for habitat and facility work		$150

Goal 6: Administration and Operations (Continued)

Action	Short-term or project-specific costs (thousands)	Recurring cost per year (thousands)
4. Construct new boat landing and other accesses and parking areas	$500	
5. Hire public information specialist to improve communication with public and media on Refuge programs and services		$100
6. Hire part-time receptionist at Headquarters to handle public inquiries and assist with permit management		$40
7. Hire additional staff (3) for the new Lost Mound Unit (9,715 acres) to support biological, public use, and maintenance needs		$200

New Funding Summary by Major Category to Fully Implement the CCP

Action	Short-term or project-specific costs	Recurring cost per year
1. Land Acquisition within approved boundary		$1.5 million
2. Environmental Pool Plan habitat restoration and enhancement projects in lieu of other funding such as EMP or pending Navigation/Ecosystem initiative	$150.0 million	
3. Access Trust Fund for pool drawdowns	$ 3.0 million	
4. Office and maintenance building construction	$13.5 million	$.1 million
5. General operations and maintenance	$ 1.9 million	$2.36 million
Total	**$168.4 million**	**$3.96 million**

Summary of Step-down Plans Needed

Land Use Allocation Plan (revise, 2021)
Research Natural Area Management Plan (new, 2010)
Wildlife Inventory and Monitoring Plan (revise, 2008)
Habitat Management Plan, including grasslands (new, 2021)
Invasive Plant Control and Management Plan (new, 2009)
Threatened, Endangered and Candidate Species (new)
Fishery and Mussel Management Plan, including invasive aquatic animals (new, 2008)
Fire Management Plan (revise as needed)
Forest Management Plan (new, 2010)
Hunting Plan (revise, 2007)
Fishing Plan (new, 2008)
Visitor Services Plan (new, 2008)
Trapping Plan (revise, 2007)
Law Enforcement Plan (new, 2006)
Plans or guidelines for:

Gibbs Lake Area, Pool 7 (new, 2006)
Commercial fish floats (new, 2006)
Fishing tournaments (new, 2008)
Beach management with Corps of Engineers and states (new/revised, 2006 and ongoing)
Guides and guiding (new, 2008)

Near-term Implementation (3 years)

CY 2006 Actions

Complete and/or plan drawdowns and EMP projects
Law Enforcement step-down plan
Gibbs Lake Area Plan
Begin drafting Trapping Plan
Public and media outreach on recreation changes
Publish new regulations for 2007 recreation changes
Design new signs for closed areas, electric motor areas, slow, no wake areas, etc.
Write and design new information leaflets
Design new kiosk maps
Outreach for Savanna District hunting changes
Guidelines for fish float operations and maintenance
Initiate beach planning on select pools with Corps of Engineers and state

CY 2007 Actions

Complete and/or plan drawdowns and EMP projects
Implement new guidelines and regulations dealing with closed areas, electric motor areas, slow, no wake areas, beach use, dogs, permanent blinds, etc.
Begin process for establishing No Wake Zones with local units of government
Revise Hunting Plan
Complete Trapping Plan

CY 2008

Complete and/or plan drawdowns and EMP projects
Complete a Wetland of International Importance designation package (RAMSAR)
Revise Wildlife Inventory Plan
Establish Refuge Research Team
Complete Fishery and Mussel Management Plan
Complete Recreational Fishing Plan
Complete fishing tournament guidelines
Complete commercial guiding guidelines

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Monitoring and Evaluation

Objectives and strategies implemented will be continually monitored and evaluated during the 15-year life of the plan. The wildlife inventory and monitoring plan update will be critical since fish and wildlife are important barometers of habitat condition and health. Many of the objectives in the plan deal directly with better monitoring and evaluation, and in this regard, adequate staffing and continued partnerships with the Corps of Engineers, states, U.S. Geological Survey, and others will be important. Many actions inherent in the plan are new directions and monitoring will help understand the effects of the actions on habitat, fish and wildlife populations, and public use patterns and levels. There will also be a growing need to understand the impacts of recreation on fish, wildlife, and habitat as use levels increase and means of use change. In addition, the Mississippi River and its watershed will certainly change, and likely in ways unforeseen. Land use changes, invasive species, floods, disease outbreaks, and climate may alter expected outcomes, and monitoring will be critical to detecting and reacting to such change.

Plan Review and Revision

As noted above, environmental change and unforeseen effects may call for changes in the plan. The Refuge will practice adaptive management, using monitoring, evaluation, and experimentation to learn and change aspects of the plan as needed. For example, a change in the size and distribution of Waterfowl Hunting Closed Areas is proposed to achieve a better distribution of feeding and resting areas for fall migrants. Weekly aerial surveys in the

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fall will provide necessary waterfowl use data to gauge effectiveness of the changes, and along with impacts from human disturbance, form the basis for any needed boundary and regulation modifications.

Since the CCP will be a constant reference and guide for Refuge staff, internal review will be continuous. In addition, it is expected that the public and partners will offer continuous feedback. At least every 3 years, representatives of the Corps of Engineers, states, other agencies, and non-profit and citizen groups will be invited to meet and provide more formal input into what is working, what is not, and possible changes the Refuge should consider. Revisions will be undertaken as needed by amendments to the CCP. There will be an opportunity for public review and comment prior to making any substantive changes. A major plan review and re-write will occur after 15 years.

Partnerships

Refuge staff works closely with the departments of natural resources of Minnesota, Wisconsin, Iowa, and Illinois in designing and carrying out projects and programs. The Corps of Engineers is a critical partner due to its dominant role in navigation, water level management, forestry, and the planning and construction of environmental restoration projects. Much of the habitat restoration and enhancement work is done through the Environmental Management Program administered by the Corps, and this work could accelerate should Congress approve and fund the Navigation and Environmental Sustainability Program (NESP).

The U. S. Geological Survey, Environmental Protection Agency, Department of Agriculture, and state-level counterpart agencies all play a role in biological monitoring, research, environmental regulation, and policy making on the river, and thus the Refuge. Other U.S. Fish and Wildlife Service programs such as fisheries and ecological services also play a key role, both as leaders for certain projects and programs, and in support. The Service's Partners for Fish and Wildlife Program will continue to play a critical role in working with private landowners to improve the watersheds of the Refuge.

Conservation organizations are active in policy issues and/or land acquisition affecting the Refuge and include Audubon, The Nature Conservancy, Izaak Walton League, and American Rivers. A host of local conservation and sporting organizations like the La Crosse County Conservation Alliance are active. Lastly, many citizen conservationists help the Refuge as volunteers and as members of the Friends of the Upper Mississippi River Refuges, a citizen support group.

The forum for bringing together such a diversity of partners, who often have different missions and agendas, is both formal and informal. Established associations, commissions, committees, and working groups bring people together; plans, planning, and public meetings allow input from everyone. Specific projects and events let citizens lend a helping hand. These partnerships will remain an important part of plan implementation, both in gaining and maintaining public and partner understanding and support, and through the joint funding of specific actions.

Figure 36: Refuge Staffing

Appendix A: Record of Decision

Appendix B: Glossary

Appendix B: Glossary of Terms

Alternative

A set of objectives and strategies needed to achieve refuge goals and the desired future condition.

Biological Diversity

The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Closed Area

Closed Area, Existing Condition: closed to all migratory bird hunting. Other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons.

Closed Area, CCP: closed to all migratory bird hunting. Other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons. The public will be asked to practice Voluntary Avoidance (VA) i.e. limiting entry, on all closed areas ("Large" and "Small") October 15 to the end of the respective state duck hunting season and in addition there will be a "no motor" restriction on Small closed areas October 15 to the end of the regular state duck hunting season. Large closed areas are greater than 1,000 acres and small closed areas are ~1,000 acres or less. "No motors" means the use of motors on watercraft is not allowed

Compatible Use

A wildlife-dependent recreational use, or any other use on a refuge that will not materially interfere with or detract from the fulfillment of the mission of the Service or the purposes of the refuge.

Comprehensive Conservation Plan

A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System.

Cultural Resources

"Those parts of the physical environment -- natural and built -- that have cultural value to some kind of sociocultural group ... [and] those non-material human social institutions...."(King, 1988) Cultural resources include historic sites, archeological sites and associated artifacts, sacred sites, traditional cultural properties, cultural items (human remains, funerary objects, sacred objects, and objects of cultural patrimony) (McManamon, 1997), and buildings and structures.

Drawdowns

The process of temporarily lowering water levels of Pools during the summer months to stimulate the growth of aquatic plants in the lower to middle portions of the pools.

Ecosystem

A dynamic and interrelated complex of plant and animal communities and their associated non-living environment.

Ecosystem Management

Management of an ecosystem that includes all ecological, social and economic components that make up the whole of the system.

Electric Motor Areas

Areas closed year-round to all motorized vehicles and watercraft except watercraft powered by electric motors or non-motorized means. The possession of other watercraft motors is not prohibited, only their use. For example, anglers could switch to an electric trolling motor when entering these areas.

Endangered Species

Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.

Environmental Impact Statement

A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.

Environmental Management Program

This program is funded and administered by the U.S. Army Corps of Engineers to construct habitat rehabilitation and enhancement projects and to conduct long-term resource monitoring of biological and physical features of the Upper Mississippi River System

Environmental Pool Plans

These plans identify a desired future habitat condition within Pools 2-22 toward which agencies and other river interests can strive. They are endorsed by the River Resources Forum and River Resources Coordinating Committee, (U.S. Army Corp of Engineers, St. Paul and Rock Island District, respectively), whose members include public and private organizations, and whose charters are based on a balanced approach to river resource management.

Extirpation

The local extinction of a species that is no longer found in a locality or country, but exists elsewhere in the world.

Fiscal Year

Federal Government budget year beginning October 1 and ending September 31.

Goals

Descriptive statements of desired future conditions.

Interjurisdictional Fish

Fish that occur in waters under the jurisdiction of one or more states, for which there is an interstate fishery management plan or which migrates between the waters under the jurisdiction of two or more states.

Issue

Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition.

National Wildlife Refuge System

All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife and plant resources.

Objectives

Actions to be accomplished to achieve a desired outcome.

Open Water Hunting

Open water means any water beyond a natural growth of vegetation that offers whole or partial concealment to the hunter. In Wisconsin, open water hunting is allowed by state regulations only in the Grant County portion of the Refuge, where hunters use boats/blinds so long as they are securely anchored. Minnesota does not allow open water hunting on the Mississippi River. Iowa and Illinois permit open water hunting. A traditional hunting method uses low-profile scull, or lay-out boats in open water.

Pool

The area of water impounded behind (upstream) a dam.

Preferred Alternative

The Service's selected alternative identified in the Draft Comprehensive Conservation Plan.

Project Leader

Refuge manager or District Manager.

Sanctuary

This term applies to a Refuge area where no entry is allowed. In waterfowl sanctuaries, no entry is allowed between October 1 and the end of the regular state duck hunting season.

Scoping

A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are federal, state and local agencies; private organizations; and individuals.

Slow, No Wake Areas

From March 16 through October 31 in these areas, watercraft must travel at slow, no-wake speed and no airboats or hovercraft are allowed. Respective state definitions for what constitutes "slow, no wake" speed or operation will apply as appropriate. The airboat and hovercraft prohibition refers to operation. For example, they could be propelled by electric motors or other means at slow, no wake speed inside these areas during the dates specified.

Slow, No Wake Zones

These zones require boats to travel slowly to reduce the size of wakes to protect shorelines from eroding and/or minimize safety hazards posed by heavy traffic and blind spots in narrow channels. Respective state definitions for what constitutes slow, no wake speed or operation apply in these zones.

Species

A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.

Strategies

A general approach or specific actions to achieve objectives.

Threatened Species

Those plant or animal species likely to become endangered species throughout all of or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

Vegetation

Plants in general, or the sum total of the plant life in an area.

Vegetation Type

A category of land based on potential or existing dominant plant species of a particular area.

Water Level Management

Management that involves a temporary increase or decrease in water levels for the benefit of fish and wildlife habitat.

Watershed

The entire land area that collects and drains water into a stream or stream system.

Wetland

Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.

Wildlife-dependent Recreational Use

A use on a refuge that involves hunting, fishing, wildlife observation, wildlife photography, environmental education, or interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997.

Appendix C: Project Features Tables

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Table 7: Refuge Staffing / page 195

The following project features tables are included in the Final EIS/CCP, Appendix H, but are not included in the CCP. The Final EIS/CCP is available at Refuge Headquarters, District Offices, and on the web at: http://www.fws.gov/midwest/planning/uppermiss

Auto Tour Routes
Biking Routes
Canoe Trails
Closed Areas, Alternatives A, B, C, D and E
Commercial Fishing Floats / Piers
Fishing Piers and Platforms
Hiking Trails
Kiosks, Interpretive Signs, Entrance Signs, and Official Notice Boards
Observation Decks, Towers, and Photo Blinds

Table 1: Access Locations

Pool	Feature	State	Existing FWS Landing	Existing Non-FWS Landings	CCP	River Mile
4	Beef Slough	WI	x		x	761.0
4	Pontoon Slough	WI	x		x	760.5
4	Indian Slough	WI	x		x	760.3
4	Buffalo River	WI	x		x	755.5
4	Peterson Lake	MN	x		x	754.0
4	Other Access Points			9		
5	Halfmoon	MN	x		x	747.5
5	Halfmoon Canoe Access	MN	x		x	747.5
5	Weaver	MN	x		x	744.0
5	Other Access Points			10		
5A	Verchota	MN	x		x	730.5
5A	McNally	MN	x		x	729.0
5A	Other Access Points			9		
6	Mertes Slough	WI	x		x	727.0
6	Other Access Points			13		
6	Trout Creek (non-motorized)	MN				715.0
7	Round Lake	WI	x		x	713.3
7	Long Lake	WI	x		x	713.1
7	Other Access Points			21		
8	Lower I-90	MN	x		x	701.7
8	Lawrence Lake Walk-down	MN			x	692.0
8	Lawrence Lake, South Walk-down	MN			x	691.3
8	Stoddard Walk-in Overpass	WI			x	687.9
8	Stoddard Walk-down	WI			x	687.3
8	Other Access Points			35		
9	Reno Canoe Launch (Improvement, coop with Corps of Engineers)	MN			x	681.0
9	Visgers Landing	MN	x		x	675.8
9	New Albin	IA	x		x	673.2
9	Upper Iowa River Canoe Launch	IA				671.5
9	Conway Lake Canoe Launch	IA			x	666.0
9	Winneshiek Slough	WI	x		x	665.5
9	Big Slough	WI	x		x	663.4

Table 1: Access Locations (Continued)

Pool	Feature	State	Existing FWS Landing	Existing Non-FWS Landings	CCP	River Mile
9	Cold Springs	WI	x		x	653.5
9	Other Access Points			18		
10	Ambrough Slough	WI	x		x	639.3
10	Wyalusing Park	WI	x		x	629.8
10	Bagley Bottoms	WI	x		x	624.8
10	Other Access Points			37		
11	Bertom Lake	WI	x		x	601.7
11	Lynn Hollow	WI	x		x	596.7
11	Other Access Points			17		
12	No FWS Access Points					
12	Other Access Points			10		
13	Lost Mound Boat Ramp	IL			x	552.0
13	Pleasant Creek Parking Lot & Access Road *	IA			x	549.0
13	Esmay Slough*	IA	x		x	536.0
13	Frog Pond *	IL			x	535.4
13	Sloane Marsh Parking Lot*	IL			x	532.0
13	Michelson's Landing Parking*	IL			x	524.0
13	Michelson's Landing	IL	x		x	524.0
13	Other Access Points			17		
14	No FWS Access Points					
14	Other Access Points			26		
	Canoe Landing / Launch		1	1	2**	
	Total Walk-in		0	0	4	
	Total Boat Ramp		25	221	26	
	Total Parking Lot Improvements		0	0	5	
*Parking lot improvements only. **Includes proposed cooperative improvements to Reno Canoe Access (Corps of Engineers).						

Table 2: Administrative No Hunting Zones

Pool	Feature	State	Existing or Proposed	Existing Acres	CCP Acres	Up-River Mile	Down-River Mile	Comments
4	Buffalo River	WI	P		215	756.0	755.0	Added in response to comment received during the waiting period that followed release of the Final EIS/CCP. Will not take effect until 2009 hunting season.
7	Upper Halfway Creek Marsh	WI	E	141	141	708.0	707.5	No hunting for public safety/ wildlife observ.
8	Hunter's Point	WI	E	82	82	691.2	690.4	No hunting for public safety.
10	Sturgeon Slough	WI	P		66	635.2	634.8	No hunting/trapping for public safety/wildlife observ.
11	Goetz Island Trail	IA	P		32	614.4	613.2	No hunting for public safety/ wildlife observ.
13	Crooked Slough Backwater	IL	E	2467	2467	557.0	552.8	Was Sav. Army depot; contaminated; no entry
13	Crooked Slough Proper	IL	P		192	557.0	552.8	No hunting to avoid potential user conflicts
13	Mesquaki Lake/ Great River Trail	IL	E	193	193	536.8	535.8	No hunting 3/1-9/30, and also no hunting year 'round within 150 yds. of Great River Tr. for public safety and to eliminate potential conflicts with hunters/bikers
13	Frog Pond	IL	E	64	64	535.8	535.3	No hunting for public safety/ wildlife observ.
13	Ingersoll Learning Center	IL	E	41	41	533.0	532.5	No hunting for public safety/ wildlife observ.
13	Thomson Prairie/Great River Trail	IL	E	76	76	527.5	525.0	No hunting for public safety/ wildlife observ.
13	Buffer - Potter's Marsh Managed Hunt Area	IL	E	491	491	526.0	522.5	Extends 400 yds. W. of Potter's Marsh Managed Hunt Area to eliminate potential conflicts between duck blind hunters/ other hunters
	Total		Units	8	12			
			Acres	3,555	4,060			
*	Administrative No Hunting Zones are closed to hunting for reasons of public health and safety, and to reduce user group conflicts. They are not intended to augment the waterfowl closed area system on the Refuge.							

Table 3: Closed Areas and Sanctuaries*, Existing Conditions and CCP Actions

Pool	Name	State	Existing Conditions Acres / Status		CCP Acres / Status		Comments for CCP Actions
4	Nelson-Trevino	WI	3,773	Closed Area	0	Closed Area; drop in 2009	Remains in effect until the 2009 waterfowl hunting season, then dropped.
4	Big Lake	WI	None		2,461	Closed area; VA	Drop Buffalo Slough portion proposed in Alt. E Draft. Has travel corridor. Will not take effect until the 2009 waterfowl hunting season. Voluntary Avoidance (VA)
4	Rieck's Lake	WI	Part of Peterson Lake		496	Closed area; no motors, VA	This boundary configuration will not take effect until the 2009 waterfowl hunting season; no motors, VA
4	Peterson Lake	MN-WI	3,111	Closed Area	677	Closed area; no motors, VA	This boundary configuration will not take effect until the 2009 waterfowl hunting season; has travel corridor; no motors, VA; Rieck's Lake and Buffalo Slough are currently included in this area.
5	Weaver Bottoms / Lost Island	MN-WI	3,139	Closed Area	3,508	Closed area; VA	Drop boundary correction proposed in Alt. E Draft that added 185 acres on WI side; has travel corridor; VA
5	Spring Lake	WI	None		243	Closed area; no motors, VA	No motors; VA
5A	Fountain City Bay	WI	None		24	Closed area; no motors, VA	Site will be a closed area if land exchange with WDNR does not occur. No motors;VA
5A	Polander Lake	MN-WI	1,589	Closed Area	1,907	Closed area; VA	Has travel corridor; VA
6	Trempealeau NWR	WI	n/a	n/a	n/a	n/a	Part of existing closed area system; special regulations; 5520 acres
7	Lake Onalaska	WI	7,348	Closed Area	7,369	Traditional closed area	Adjust boundaries at Proudfoot Slough and "Old Channel" area. Has existing VA of 3,356 acres. No change from current regulations.
8	Goose Is. No Hunt Zone	WI	876	No Hunt Zone / Closed Area	986	No hunt zone / closed area; no motors, VA	Part of existing closed area system; has 110 acre expansion; no motors and VA.
8	Wisconsin Islands	MN-WI	6,510	Closed Area	6,510	Closed area; VA	VA; adds slow, no wake zone in travel corridor on Raft Channel
9	Pool Slough	MN-IA	1,112	Closed Area	1,112	Sanctuary	Is adjacent to state (IA) sanctuary
9	Harpers Slough	IA-WI	5,209	Closed Area	5,209	Closed area; VA	VA
10	Sturgeon Slough	WI	none		340	Closed area; no motors, VA	No motors; VA

Table 3: Closed Areas and Sanctuaries*, Existing Conditions and CCP Actions (Continued)

Pool	Name	State	Existing Conditions Acres / Status		CCP Acres / Status		Comments for CCP Actions
10	12-Mile Island	IA	540	Closed Area	540	Closed area; no motors, VA	Pool 10 portion; no motors, VA
11	Guttenberg Ponds	IA	None		252	Sanctuary	Sanctuary located within 12-mile Island closed area
11	12-Mile Island	IA	1,396	Closed Area	1,145	Closed area; VA	Pool 11 portion of closed area; adds Swift Slough travel corridor; VA
11	Bertom-McCartney	WI	2,415	Closed Area	2,384	Traditional closed area	Does not include Bertom Island, a no entry area year round; no change from current regulations (no motor restriction or VA in this closed area).
11	John Deere Marsh	IA	None		439	Closed area; no motors, VA	Includes travel corridor; no motors, VA
12	Kehough Slough	IL	None		343	Closed area; no motors, VA	No motors, VA
13	Pleasant Creek	IA	2,603	Closed Area	2,067	Closed area; VA	VA
13	Spring Lake	IL	3,686	Sanctuary	3,686	Sanctuary	Only Existing Sanctuary in Refuge; remains sanctuary
13	Elk River	IA	1,237	Closed Area	1,237	Closed area; VA	VA
14	Beaver Island	IA	None		717	Closed area; no motors, VA	No motors, VA
	Total Acres		44,544		43,652		
	Total UMR Refuge Units		14 closed areas 1 sanctuary		20 closed areas 3 sanctuaries		
* **Closed Area, Existing Condition** = closed to all migratory bird hunting. Other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons.							
* **Closed Area, CCP** = closed to all migratory bird hunting. Other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons. The public will be asked to practice Voluntary Avoidance (VA) i.e. limiting entry, on all closed areas ("Large" and "Small") October 15 to the end of the respective state duck hunting season. In addition, there will be a "no motor" restriction on Small closed areas October 15 to the end of the regular state duck hunting season. Large closed areas are greater than 1,000 acres and small closed areas are ~1,000 acres or less. "No motors" means the use of motors on watercraft is not allowed.							

Table 4: Electric Motor Areas (E) / Slow, No Wake Areas* (S)

Pool	Feature	State	Existing Acres	CCP Acres	Up-River Mile	Down-River Mile	Distance to Landing	Comments for CCP Conditions
4	Nelson-Trevino	WI		2,626 S	762.5	760.0	0.1	Slow, no wake area, takes effect March 16, 2009
5	Island 42	MN		459 E	749.8	747.6	1.5	Electric motor area
5A	Snyder Lake	MN		182 E	735.0	734.0	2.5	Electric motor Area, adjacent to Canoe Trail
5A	Denzers Slough	MN		83 S	733.0	732.0	1.5	Slow, no wake area, adjacent to Canoe Trail
6	Mertes Slough	WI	222 E	222 E	727.0	726.0	0.1	Electric motor area
7	Black River Bottoms	WI		1,165 S	711.0	708.8	0.1	Slow, no wake area, takes effect March 16, 2008
7	Browns Marsh	WI		827 E	711.0	708.0	0.1	Electric motor area
8	Blue/Target Lake	MN		1,834 S	699.0	696.0	0.1	Slow, no wake area
8	Root River	MN		695 S	696.0	694.0	0.5	Slow, no wake area
9	Reno Bottoms	MN		2,536 S	681.0	679.2	0.1	Slow, no wake area
10	Hoosier Lake	WI		162 E	624.8	624.0	0.1	Electric motor area

Table 4: Electric Motor Areas (E) / Slow, No Wake Areas* (S) (Continued)

Pool	Feature	State	Existing Acres	CCP Acres	Up-River Mile	Down-River Mile	Distance to Landing	Comments for CCP Conditions
12	Nine Mile Island	IA		454 S	574.4	571.6	0.3	Slow, no wake area
14	Princeton (formerly Rock Creek)	IA		327 S	506.7	506.0	1.3	Slow, no wake area
	Total Acres		222	11,572	*CCP Action: 5 Electric motor areas cover 1,852 acres, 8 Slow, no wake areas cover 9,720 acres			
	Total Units		1	13				
Electric Motor Areas. Areas closed year-round to all motorized vehicles and watercraft except watercraft powered by electric motors or non-motorized means. The possession of other watercraft motors is not prohibited, only their use. For example, anglers could switch to an electric trolling motor when entering these areas.								
Slow, No Wake Areas. From March 16 through October 31 in these areas, watercraft must travel at slow, no-wake speed and no airboats or hovercraft are allowed. Respective state definitions for what constitutes "slow, no wake" speed or operation will apply as appropriate. The airboat and hovercraft prohibition refers to operation. For example, they could be propelled by electric motors or other means at slow, no wake speed inside these areas during the dates specified								

Table 5: Managed/Special Hunts

Pool	Feature	State	Existing Acres	CCP Acres	Up-River Mile	Down-River Mile	Comments
7	Gibb's Lake	WI		<200	708.6	707.2	By Ocotober 1, 2006, complete a step-down hunting plan
10	Wisconsin River Delta Special Hunt Area	WI		1,406	633.8	630.7	Closed to all hunting and trapping from Nov. 1 to the end of the state duck hunting season and voluntary avoidance during the same dates.
12	Blanding Landing Managed Hunt	IL	511		557.7	556.8	End managed hunt; open area to general hunting
13	Potter's Marsh Managed Hunt	IL	1,923	1,923	526.0	522.7	No permanent blinds; boat blinds only
	Total Acres		2,434	~3,530			
	Total Units		2	3			

Table 6: No-wake Zones

Pool	Feature	State	Existing Condition	CCP	River Mile	Agency
4	Wabasha	MN	x	x	760.3	
4	Wilcox Landing	MN		x	756.5	FWS
5	Belvidere Slough	WI	x	x	747.5	
5	Halfmoon Landing	MN	x	x	747.5	FWS
5A	Fountain City Bay	WI		x	735.0	FWS
5A	Verchota Landing	MN		x	731.0	FWS
5A	McNally Landing	MN		x	729.0	FWS
6	Winona	MN	x	x	725.5	
7	Lytle's Landing	WI	x	x	710.0	
7	Brice Prairie	WI	x	x	708.0	
7	La Crosse Sailing Club	WI	x	x	705.0	
8	Black River / French Island	WI	x	x	703.0	
8	R & R Marine	WI	x	x	701.0	
8	Al's Marina	WI	x	x	700.5	
8	Clinton St. Landing	WI	x	x	700.4	
8	French Island Yacht Club	WI	x	x	700.3	
8	Taylor Island	WI	x	x	699.0	
8	Bikini Yacht Club	WI	x	x	698.0	
8	Houska Park	WI	x	x	697.0	
8	Green Island Landing	WI	x	x	695.8	
8	Chut's Landing	WI	x	x	695.3	
8	Goose Island Campground	WI	x	x	692.0	
8	Lawrence Lake Marina	MN	x	x	690.5	
8	Raft Channel*	MN		x	687.5	FWS
9	Fish Lake	IA		x	672.5	FWS
9	Cold Springs	WI		x	653.9	FWS
10	Ambrough Slough	WI	x	x	639.0	FWS
10	McGregor	IA	x	x	634.5	
10	Wyalusing Park	WI		x	630.0	FWS
10	Johnson Slough	IA		x	628.0	FWS
11	Mud Lake	IA		x	587.7	FWS
11	Sunfish Lake	WI		x	583.3	FWS
12	Hawthorne St. Boat Ramp	IA	x	x	582.0	
12	Schmitt's Harbor	IA	x	x	581.0	
12	East Dubuque	IL	x	x	579.5	

Table 6: No-wake Zones (Continued)

Pool	Feature	State	Existing Condition	CCP	River Mile	Agency
12	Midtown Marine	IL	x	x	579.0	
12	Bent Prop. Marina	IL	x	x	578.5	
12	Frentress Lake Marina	IL	x	x	576.0	
12	Massey Station	IA	x	x	573.0	
12	Ferry Landing	IL	x	x	567.0	
12	Spruce Creek County Park	IA	x	x	559.5	
13	Bellevue Municipal Landing	IA	x	x	556.8	
13	Crooked Slough **	IL			556.0	
13	Millers Hollow Landing	IL	x	x	542.0	
13	Marquette Park	IL	x	x	537.0	
13	North Sabula Access	IA	x	x	535.8	
13	South Sabula Lake	IA	x	x	534.5	
13	Spring Lake Resort	IL	x	x	533.6	
13	Spring Lake Zone **	IL			533.0	
13	Big Slough	IL	x	x	531.5	
14	Fulton Harbor	IL	x	x	519.6	
14	Ninth Avenue Ramp	IA	x	x	519.0	
14	Clinton Marina	IA	x	x	518.8	
14	Catfish Ramp	IL	x	x	517.6	
14	Camanche Boat Harbor	IA	x	x	512.3	
14	Camanche Municipal Ramp	IA	x	x	511.0	
14	Rock Creek Ramp	IA	x	x	508.0	
14	Green Gables Boat Harbor	IA	x	x	495.0	
14	Lock & Dam 14	IA	x	x	493.8	
	Total		46	57		

*Slow, no wake zone is within the Raft Channel travel corridor of the Wisconsin Islands Closed Area, in effect October 15 to the end of the duck season; CCP Action only.

** Speed/distance regulation in effect; CCP Action only.

Table 7: Refuge Staffing

	Number of Full-time Equivalents									
	Winona District		La Crosse District		McGregor District		Savanna District		District Totals	
Staff Positions	Existing	CCP	Existing	CCP	Existing	CCP	Existing	CCP	Existing	CCP
Refuge Districts										
District Manager	1	1	1	1	1	1	1	1	4	4
Assistant Manager/ Refuge Operations Specialist	1	1	1	1	2	2	1	1	5	5
Administrative Technician	1	1	1	1	1	1	1	1	4	4
Law Enforcement Refuge Officer	1	2	1	2	1	2	1	2	4	8
Visitor Services Specialist	0	1	1	1	0	1	1	1	2	4
Wildlife Biologist	1	1	1	1	0	1	0	1	1	4
Private Lands Biologist	0	1	0	1	0	1	0	1	0	4
Biological Technician	1	1	1	1	1	1	1	1	5	4
Maintenance	1	2	0	2	1	1	2	2	4	7
Receptionist / Permit Specialist (Part Time)	0.0	0.5	0.0	0.5	0.0	0.5	0.0	0.5	0.0	2.0
Lost Mound Unit	0	0	0	0	0	0	1	3	1	3
Sub-Total Positions / Each District[1]	7.0	11.5	7.0	11.5	7.0	11.5	9.0	14.5	30.0	49.0

1. *There will be some latitude in the types of positions filled. For example, a District may need 2 biological technicians instead of the standard 1.*

Table 7: Refuge Staffing (Continued)

Refuge Headquarters	Existing	CCP
Complex Manager	1	1
Administrative Officer	1	1
Environmental Engineer	1	1
Visitor Services Specialist	1	2**
Watershed Biologist	1	1
Wildlife Biologist	1	1
Forester	0	1
Fishery Biologist	0	1
Geographic Information System (GIS) Specialist	1	1
Public Information Specialist	0	1
Receptionist (Part time)	0	0.5
Sub-Total- Headquarters	7.0	11.5
District Totals	30.0	49.0
Refuge Wide Total Positions	37.0	60.5
** 1 person stationed at the National Mississippi River Museum, Dubuque, Iowa.		

Appendix D: Applicable Laws and Executive Orders

Appendix D: Applicable Laws and Executive Orders

Rivers and Harbor Act (1899) (33 U.S.C. 403): Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, federal or non-federal, to the hunting of migratory birds.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

Fish and Wildlife Coordination Act (1934), as amended (1958): Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

Historic Sites, Buildings and Antiquities Act (1935) as amended: Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

Refuge Revenue Sharing Act (1935) as amended: Requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (1948): Provides that upon a determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred without reimbursement to the Secretary of Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Federal Records Act (1950): Directs preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Wilderness Act (1964) as amended: Directed the Secretary of Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture

was directed to study and recommend suitable areas in the National Forest System.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

National Wildlife Refuge System Administration Act (1966): (16 USC 668dd-668ee) Provides for administration, management, and planning for National Wildlife Refuges.

National Historic Preservation Act (1966) as amended: Establishes as policy that the federal government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major federal action significantly affecting the quality of the human environment.

Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970) as amended: Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

Endangered Species Act (1973): Requires all federal agencies to carry out programs for the conservation of endangered and threatened species.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the federal government to ensure that anybody can participate in any program.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in federal construction projects.

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95- 87) (SMCRA): Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Executive Order 11988, Floodplain Management (1977): Each federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990, Protection of Wetlands (1977): Order directs federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Fish and Wildlife Improvement Act (1978): Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program.

Archaeological Resources Protection Act (1979) as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires federal managers to develop plans and schedules to locate archaeological resources.

Fish and Wildlife Conservation Act of 1980 (16 USC 661-667e) as amended: Requires the Fish and Wildlife Service to monitor non-game bird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.

Federal Farmland Protection Policy Act (1981) as amended: Minimizes the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Consolidated Farm and Rural Development Act (1961) as amended January 23, 2004: provides loans for soil and water conservation and protection, water treatment and many other agricultural related activities.

U.S. Fish and Wildlife Service Region 3, Regional Director Bulletin (1983): Changes spelling from wild life to "wildlife" in Refuge name.

Emergency Wetlands Resources Act (1986): Promotes the conservation of migratory waterfowl and

offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other federal and state agencies.

Native American Graves Protection and Repatriation Act (1990): Requires federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Executive Order 12898, Environmental Justice for Minority Populations (1994): Establishes environmental justice as a federal government priority and directs all federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Executive Order 12962, Recreational Fisheries (1995): Federal agencies shall, to the extent permitted by law and where practicable, and in cooperation with States and Tribes, improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

Executive Order 13006, Locating Federal Facilities On Historic Properties In Our Nation's Central Cities (1996): strengthen our Nation's cities by encouraging the location of federal facilities in our central cities.

Executive Order 13007 Indian Sacred Sites (1996): Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

National Wildlife Refuge System Improvement Act (1997) PL 105-57: This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966. Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012.

Migratory Bird Treaty Reform Act (1998): Public law 105-312 amends the first section and section 2 of the Upper Mississippi River Wild Life and Fish Refuge Act (16 U.S.C. 721,722) by striking "Upper Mississippi River Wild Life and Fish Refuge" each place it appears and inserting "Upper Mississippi River National Wildlife and Fish Refuge."

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998): Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

Executive Order 13112 Invasive Species (1999): directs federal agencies to prevent the introduction of invasive species, control populations of such species, monitor invasive species populations, provide for restoration of native species and habitat conditions in ecosystems that have been invaded, conduct research, promote public education on invasive species and the means to address them, and consult with the Invasive Species Council.

Secretarial Order 3226, Evaluating Climate Change Impacts in Management Planning, 2000: Directs each Department of Interior bureau to consider and analyze potential climate change impacts when undertaking long-range planning efforts or multi-year management plans.

Director's Order Number 132 (January 18, 2001): National Wildlife Refuge System Mission, Goals and Purposes. This reiterates the mission of the Refuge System and how it relates to the mission of the Fish and Wildlife Service. Order also provides guidance on the use of goals and purposes in the administration and management of the system.

Appendix F: Literature Cited

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Appendix G: National Wildlife Refuge System Policy Changes

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New U.S. Fish and Wildlife Service policies for the National Wildlife Refuge System were issued on June 26, 2006, late in the planning process. These new policies set forth new goals for the system, and new policies for hunting and other recreational uses on refuges. They are similar to the guidance in place during preparation of the CCP, but wording and scope changed to some degree and they will be used and consulted as the CCP is implemented. These new policies are referenced in the CCP (Chapter 1, page 3 and Chapter 4, Objective 4.4, page 125) and are excerpted and summarized below.

Goals of the National Wildlife Refuge System (601 FW 1)

A. Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.

B. Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.

C. Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.

D. Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).

E. Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

Summary of New Recreation Policy, Especially Hunting, on National Wildlife Refuges (605 FW 1 and 605 FW 2)

General Guidelines for Quality Wildlife-Dependent Recreation

Promotes safety of participants, other visitors, and facilities
Promotes compliance with applicable laws and regulations and responsible behavior
Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan
Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation
Promotes accessibility and availability to a broad spectrum of the American people
Promotes resource stewardship and conservation
Promotes public understanding and increases appreciation of natural resources
Provides reliable/reasonable opportunities to experience wildlife
Uses facilities that are accessible to people and blend into the natural setting
Uses visitor satisfaction to help define and evaluate programs

Guiding Principles for the Refuge System's Hunting Programs

Manage wildlife populations consistent with management plans
Promote visitor understanding of and increase appreciation for America's natural resources
Provide opportunities for quality recreational and educational experiences consistent with the

quality guidelines for wildlife-dependent recreation above

Encourage participation in this tradition which is deeply rooted in America's natural heritage and conservation history

Minimize conflicts with visitors participating in other wildlife-dependent recreation

Guidance on How to Manage Refuge Hunting Programs

General: In ways that conserve fish and wildlife and their habitats, ensure hunter and visitor safety, comply with applicable state and federal laws and regulations, and promote respect for the resource.

Boundary hunting: We discourage hunting adjacent to refuge areas or neighboring lands closed to hunting.

Zoning uses: We may use time and space zoning to achieve balanced hunting